



**NURSES' KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING
PREVENTION OF PRESSURE ULCERS IN A SELECTED DISTRICT
HOSPITAL IN RWANDA**

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HOSPITAL IN RWANDA**

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June, 2017

DECLARATION

I, MWISENEZA Marie Josée, hereby declare that the study entitled “Nurses’ Knowledge, Attitudes and Practices regarding prevention of pressure ulcers in a selected district Hospital in Rwanda” contains my own work, that it has not been submitted for any degree or examination at any other higher learning institution, and that all references have, to the best of my knowledge, been correctly reported and acknowledged.

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28 /07/ 2017

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DEDICATION

To my husband HAVUGIMANA Athanase, to my children: HAVUGIMANA CYUBAHIRO Bruno, HAVUGIMANA MAHORO Ange Parfait, HAVUGIMANA KALIZA Alvina and HAVUGIMANA GAHOZO Josiane, for your love, encouragement, support and incomparable patience, this dissertation is tenderly dedicated.

It is also dedicated to all conscious nurses and other health care providers, who despite of unfavorable working conditions, they always strive to provide the best quality of care to the human being without reserve.

To all who contributed in achievement of this project, this dissertation is dedicated

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All people not mentioned herein and who contributed to the completion and success in my studies; please accept my deep sincere thanks.

May God bless you all.

ABSTRACT

Background: Pressure ulcers (PU) are associated with long stay in the hospital and notably create a financial burden to family and health care system as well. PU can result in mortality and psycho-social consequences. Although PU prevention remains a concern for all healthcare practitioners, maintenance of skin integrity and PU prevention is primarily nurses' role.

Aim of the Study: The aim of this study was to assess the knowledge, attitudes and practices regarding prevention of PU among nurses working at Kibagabaga district hospital in Rwanda.

Methods: A non experimental, quantitative research approach and cross-sectional descriptive design was used. A total population sampling method, consisting of 128 nurses was used. The sample size consisted of all 128 nurses caring for patients with or at risk of PU and who were willing to participate in the study. Pieper Pressure Ulcer Knowledge Test, The Staff Attitude Scale and Facility Assessment Checklists were used to collect the data and a response rate of 80 % (102) was achieved. Data were analyzed using SPSS (version 21). Frequencies, means, and standard deviations were used to summarize socio-demographic characteristics and to determine mean scores of knowledge, attitudes and practices among participants. One-way ANOVA and Independent samples t-test were performed to compare means. Pearson correlation coefficient (r) was calculated to test the correlation between nurses' knowledge, attitudes and practices. A p-value of 0.05 was considered as significant.

Results: The majority of nurses (77.8%) had a very low (< 60%) knowledge (mean= 55.34, SD=9.87). 87.3% of nurses exhibited a positive attitude towards PU prevention. 69% of nurses demonstrated between moderate and very high level of practice: Moderate (51.5%), high (14.4%) and very high level of practice (3.1%) in regard to PU prevention respectively. Nearly a half (40%) of nurses had low level of practice: 18.6% had low and 12.4% had very low level of practice respectively.

Conclusion: Knowledge of the nurses regarding prevention of PU was very low. The majority of nurses had a positive attitude toward PU prevention. A non-negligible proportion of nurses had a low and very low level of practice towards PU prevention. A lower positive correlation between the nurses knowledge and their attitudes ($r=0.178$, $p=0.078$), as well as negative correlation between the knowledge and the practices towards PU prevention ($r=-0.107$, $p=0.303$) were identified. Nurses attitudes were also negatively correlated with their practices ($r=-0.183$, $p=0.074$).

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LIST OF ABBREVIATIONS/ACRONYMS

ANOVA: Analyze of Variance

AHCRQ: Agency for health care research and quality

CMHS: College of Medicine and Health Sciences

CPD: Continuous Professional Development

KAP: Knowledge, Attitudes and Practices

NPUAP: National Pressure Ulcer Advisory Panel,

EPUAP: European Pressure Ulcer Advisory Panel

PPPIA: Pan Pacific Pressure Injury Alliance

IRB: Institute Review Board

IHI: Institute for Health Care Improvement

PU: Pressure Ulcer

UR: University of Rwanda

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CHAPTER I: INTRODUCTION TO THE STUDY

1.0. INTRODUCTION

This chapter provides an overview of pressure ulcer in both developed and developing countries including Rwanda. In addition to that, the background about the nurses' knowledge, attitude and practice regarding pressure ulcers among those countries will be also discussed. Key terms definition are also provided.

1.1 KEY TERMS DEFINITION

Nurses' knowledge: according to Cambridge English dictionary(2009) knowledge is defined as understanding of information about subject that you get by experience or the study either known by one person or by people generally.

In this study, Nurses' knowledge means nurses 'level of remembering or recalling, understanding and application of pressure ulcer information about preventive measures in terms of the following detailed areas: pressure ulcer staging, description, mechanism of development, risk factors for occurrence, risk assessment , mechanical load management , preventive strategies and appropriate education for the patient.

Nurses' attitude: according to WHO, (2014), attitude means what is believed (WHO, 2014), feeling or way of thinking that affects a person's behavior. According to business dictionary (2013), attitude is "A predisposition or a tendency to respond positively or negatively towards a certain idea, object, person, or situation and it influence an individual's choice of action, and responses to challenges, incentives, and rewards".

In this study, nurses 'attitudes refers to the level of nurses' of perceiving, responding, and valuing pressure ulcer prevention in terms of: pressure ulcer staging, description, mechanism of development, risk factors for occurrence, risk assessment , mechanical load management , preventive strategies and appropriate education for the patient.

Nurses' practice: according to WHO, (2014) practice means "what is done". It is action rather than thought or idea and require the use of ideas, believes, or skills, as opposed to theories relating to it(Cambridge dictionary, 2009). In this study, Nurses' practice refers to the level of nurses' ability to apply their knowledge by caring out specific procedures or hands on of pressure ulcer prevention in the specific areas of pressure ulcers prevention. These areas include: assessment of risk of developing PU and appropriate use of risk assessment tools (Braden scale , Norton scale, Gosnell scale, the Knoll scale and the Waterlow scale,) skin care, appropriate nutrition support for healthy skin maintenance, mechanical load management and appropriate education of the patient.

Pressure ulcer: "A pressure ulcer is localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear"(European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel, 2014)

Pieper pressure ulcer knowledge test: is a tool consisting 47 questions and has been developed by Pieper and Mott in 1995 to examine the knowledge of nurses on pressure ulcer prevention, staging, and wound description. (Pieper B, Mott M, 1995)

Medical-surgical services: In this dissertation, medical-surgical services mean services caring for hospitalized and ambulatory adult persons both males and females. This includes: medical or internal medicine in patient-ward (for men and women) and surgical in patient ward (for both men and women), accident and emergency, palliative care and outpatient department (OPD service).

Maternal-child services: in this dissertation, Maternal-child services mean Maternity services including labor ward, immediate post-partum (including post cesarean ward) late post-partum and neonatal wards.

1.2 BACKGROUND TO THE STUDY

Pressure ulcers (PU) also known as pressure sores, decubitus ulcers, or bedsores, are defined by the National Pressure Ulcer Advisory Panel (NPUAP) as “localized injury to the skin and or underlying tissue usually over a bony prominence, as a result of pressure or pressure in combination with shear and or friction”(European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel, 2014). Pressure ulcers result in both physical and psychological complications such as pain, discomfort, interrupted skin integrity, anxiety, and interrupted family role (Nuru *et al.*, 2015). In addition, PU can be a financial burden to family as patients can spend more time confined to bed without being productive. (Adegoke *et al.*, 2013; Mwebaza *et al.*, 2014; Ingwu, Ayanor and Ohaeri, 2015)

According to C.K.Sen,G.M.Gordillo, S. Roy et al (2009) as further cited by Mwebaza *et al.*(2014), each year, an average of 60,000 people per year worldwide die from PU-related complications such sepsis. Around 3 millions of people in united state of America are affected by PU. (AHRQ, 2013).

In 2013, in European hospitals, PU prevalence was ranged between 1% to11% in internal medicine and 4.7% to 66% in surgical inpatient service (R.Chou,T.Dana,C.Bougatsos et al,2013). In Sweden, in university hospitals, specifically in the intensive care unit the prevalence was 23.9% as described by Gunnigberg (2004) and further cited by Adegoke and colleagues in 2013. In Dutch intensive care Unit, the prevalence was 28.7% as described by Bours and colleagues and further more cited by Adegoke *et al.*, in 2013). In addition to these PU prevalence, Woodbury MG & Houghton PE. revealed that, among patients admitted in Canadian hospital settings in 2004, 26 percent developed PU this was further more cited by Mwebanza and colleagues in 2014.(Mwebaza, 2014)

In African countries such as Ethiopia, the prevalence of PU was 16.8% with 62% of them being stage I and 26.8% being stage II and 2.8 being stage IV (Gedamu, Hailu and Amano, 2014). Furthermore in 2014 in Nigeria, referring to the study done by Onche et al, 2004 as further cited by Uba et al, 2015 in their research: 16 out of 24 spinal cord injured patients developed pressure ulcer. The most attributable cause of that high incidence were insufficient knowledge of health care providers about preventive measures and lack of institutional or hospital policy on usage of pressure redistributing materials (Florin, Bååth, Gunningberg & Mårtensson, 2014).

Common risk factors associated with PU development include limitation in activity, altered level of consciousness, increased age, impaired nutrition and urinary incontinence (Adegoke *et al.*, 2013; Gedamu, Hailu and Amano, 2014). Moreover, the research done by Werku Etafa, (2015) in Addis Ababa, Ethiopia, revealed other factors associated with PU such as heavy work load, shortage of staff, low level of nurses knowledge (63.85%), poor nurses attitude (52%), and low level of practice (33.42%) (Etafa, 2015).

In Rwanda, in 2015, a three month survey conducted by Gedeo M. and Jessie S. in ICU Kigali University Teaching Hospital showed that PU incidence was 15%, and a prevalence of 41% (Mutabazi G. & Silver J., 2015).

Clinical measurements to prevent and manage the PU have been established by the national pressure ulcer advisory panel and are summarized into five categories including: risk assessment, skin care, support surfaces repositioning and provision of nutritional

Pressure ulcer prevention is an obligation to all health care practitioners but nurses are more concerned. According to Florence Nightingale and further cited by Leathey E. Smith, 2014; "If a patient develops a pressure ulcer, it is the fault of the nursing and not her/his disease". In the same perspective, Leathey E. Smith (2014) states that the presence of PU in a hospital can be a mirror of quality of care in Nursing.

It has been proved that nurses 'knowledge and positive attitude in a given domain have strong impact on the quality of care they provide (Ingwu, Ayanor and Ohaeri,

2015). Therefore nurses' knowledge of pressure ulcer, risk factors, stages, complications and the usage of various scales to predict pressure ulcer risk of development, are of the crucial importance to reduce PU and their related cost at large (Ingwu, Ayanor and Ohaeri, 2015).

In Rwanda, there has been limited research evidence addressing nurse's knowledge, attitude and practice regarding pressure ulcer. Therefore, the aim of the present study is to assess knowledge, attitude and practice of nurses regarding pressures ulcers to give insight for the nurses, the management of the hospital and other researchers for possible interventions.

1.3 PROBLEM STATEMENT

Each year an estimate of 60,000 people worldwide die from PU related complications with an estimate of \$355 millions being spent to medical care related to PU (Gedamu, Hailu and Amano, 2014). Between the periods of 2013-2017, the researcher's anecdotal observations during clinical supervision at Kibagabaga Hospital revealed that the majority of hospitalized patients (around 15 out of 24 patients) especially in medical surgical services were presenting pressure ulcers. This is a critical issue, because PU extends the patient period of stay in the hospital (Bwanjugu & Rhoda, 2012). The causes behind this situation are not identified and different practices put in place to solve the problem have not been yet studied.

With reference to Uba et al. (2009) statement, the cost of care to PU can be less than a half to the total cost if prevention measures are put in place. With this in mind, the literature has shown that nurses are in the better position to prevent (Nuru *et al.*, 2015) PU. However, this would be only possible if they have adequate level of knowledge, positive attitudes and better practices (Ingwu, Ayanor and Ohaeri, 2015).

To the best of our knowledge, the level of nurses' knowledge, attitudes and practices towards PU has not been studied in Rwanda and specifically at Kibagabaga district hospital.

Therefore, contextual and empirical data on the nurses 'knowledge, attitudes and practices towards PU have to be available to be used for regional and international comparisons.

1.4. OBJECTIVES

1.4.1. Main Objective

The aim of this study is to assess Knowledge, attitudes and practices on prevention of pressure ulcers among nurses working at Kibagabaga district hospital

1.4.2. Specific objectives

1. To determine the level of nurses' knowledge, attitudes and practices regarding pressure ulcer prevention
2. To assess socio-demographic factors associated with knowledge, attitude and practice of nurses towards pressure ulcer prevention.
3. To identify any relationship between Nurses' Knowledge, Attitudes and Practices

1.5. RESEARCH QUESTIONS

1. What is the level of knowledge, attitudes and practices regarding pressure ulcer prevention among nurses working at Kibagabaga District Hospital?
2. What are the socio-demographic factors associated with knowledge, attitude and practice of nurses towards pressure ulcer prevention.
3. Is there any relationship between Nurses' Knowledge, Attitudes and Practices in regards to prevention of PU?

1.6. SIGNIFICANCE OF THE STUDY

Nurses play an important role in the prevention of PU and there is an empirical evidence between quality of care of nurses and pressure ulcer development(Adegoke *et al.*, 2013).

This study will assess the level of knowledge, attitude and practices of nurses towards pressure at Kibagabaga Hospital. The results of the present study will provide a picture on the KAP on the ground, hence any gap in the results, will help the institution (Kibagabaga hospital) to organize in service trainings to increase nurse's awareness, knowledge and practices about PU prevention. In the same way, this will enhance the quality of care provided by nurses.

Importantly, the results may serve the management of the hospital to put in place clinical guidelines and policies about pressure ulcer prevention. To nurse educators, the results of the present study may serve as guidance and evidence based information, while teaching pressure ulcers. Finally, the study will extend the existing board of knowledge and serves as baseline reference for future researches about pressure ulcers.

1.9. ORGANIZATION OF THE STUDY

This study is divided into five chapters. Chapter one focuses on general introduction, definition of key concepts, background of the study, objectives and research questions, significance of the study and limitations of study. Chapter two describes the literature review of the study and chapter three mainly covers the research methodology where the study area, study design, study population, sample size and selection, and data collection instrument are described. Chapter four presents the analysis and the research findings. Chapters five discuss the results of the present study in the light of other studies and finally chapter six deals with the general conclusion and recommendations.

CHAPTER II: LITERATURE REVIEW

2.0. Introduction

The current study aimed at assessing nurses' knowledge, attitudes and practices of nurses working at a certain district hospital in Rwanda.

A literature review helps the researcher to identify the existing evidence or what known and not known about the research topic. It also serves as guidance while choosing the method to be used for the research and interpretation of its findings, (Polit and Beck, 2014). Therefore, this chapter discusses the literature review carried out to identify nurse's knowledge, attitude and practice about the prevention of pressure ulcers.

2.1 Definition of pressure ulcer

Pressure ulcers are common health problems among patients confined to bed for long time in health settings and/or in community. According to (European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel, 2014) pressure ulcer is defined as "localized injury to the skin and or underlying tissue usually over a bony prominence, as a result of pressure or pressure in combination with shear and or friction"(European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel, 2014)

2.2 Mechanism of development of pressure ulcers and staging

According to Porth's pathophysiology, prolonged unrelieved pressure to the tissues reduces local blood supply and consequently the amount of oxygen and nutrients to the tissue reduces; the skin becomes pale. When the pressure is maintained for more than two hours, blood cells clot and damage the capillary wall allowing blood cells and plasma to leak into surrounding interstitial space. This results in skin discoloration and non-blanchable erythema normally known as first category of pressure ulcer.

If no intervention done to relieve the pressure, the prolonged tissue oxygen deprivation (ischemia) will lead to skin tissues necrosis (death) and break down. From there, different categories or stages of pressure ulcers may develop depending on the amount and duration of pressure (Islam, Sae-Sia and Khupantavee, 2010; Sheila Grossman, 2014).

Bony prominences are the most areas of PU development. These include: ischium (43.6%), sacrum (18.8%), Greater trochanter (10.3%), heels (7.7%), low back (9.0%), occiput (2.6%), upper back and shoulder (2.6%) malleolus (2.3%), (Shariful I., 2010; Adegoke, Odole, Akindele, & Akinpelu, 2013; Uba et al, 2015, Porth's pathophysiology: concepts of altered health states, 9th Edition; Agency for health care research and quality, 2013; Gedamuet all, 2014 & NPUAP/EPUAP/PPPIA, 2014).

National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel classify PU in four categories. In the first Category, the patient may have a localized non-blanchable redness erythematic usually over a bony prominence. The patient may also have skin discoloration, warmth, edema, hardness or pain. However, for most of the time the lesion is unnoticed to individuals with black color and they may be at high risk for developing PU.

The "Category/Stage II is described as "Partial thickness skin loss or blister Partial thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough. It May also present as an intact or open/ruptured serum filled or sero-sanguinous filled blister. Further description: Presents as a shiny or dry shallow ulcer without slough or bruising. This category/stage should not be used to describe skin tears, tape burns, and incontinence associated dermatitis, maceration or excoriation".

The "Category/Stage III is described as, "Full thickness skin loss (fat visible) subcutaneous fat may be visible but bone, tendon or muscles are not exposed. Some slough may be present, may include undermining and tunneling.

Further description: The depth of a Category/Stage III pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have (adipose) subcutaneous tissue and Category/Stage III ulcers can be shallow.

In contrast, areas of significant adiposity can develop extremely deep Category/Stage III pressure ulcers. Bone/tendon is not visible or directly palpable.”

The fourth “Category/Stage, is described as “Full thickness tissue loss (muscle/bone visible) Full thickness tissue loss with exposed bone, tendon or muscle. Slough or eschar may be present and often include undermining and tunneling. The depth of this Category/Stage of pressure ulcer may also vary by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have (adipose) subcutaneous tissue and these ulcers can be shallow. Category/Stage IV ulcers can extend into muscle and/or supporting structures (e.g., fascia, tendon or joint capsule) making osteomyelitis or osteitis likely to occur. Exposed bone/muscle is visible or directly palpable” (European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel, 2014; Islam et al., 2010).

2.3. Risk factors associated with pressure ulcers

Evidences from a randomized control study in Turkey involving a group of immobilized patient having pressures ulcers (N=32) and a control group with immobilized patients without PU(N=30), identified stool and urine incontinences(81.2%), smoking(46.8%), anemia (46,8%), nonuse of pressure-reducing bed surface(81,3%) and irregular patient’s position change in bed as the major risk factors associated with the development of pressure ulcers (Seray Külçü Çakmak,2009).

Different studies confirmed that pressure ulcers can affect patients of all age groups; with old age being the major risk for developing PU (Guy H.,2011; Adegoke, Odole, Akindele, & Akinpelu, 2013; Balzer, Katrin Kottner & Jan, 2015 and Uba, et al, 2015). The greatest reported risk factor has been the loss of independent mobility and sensation (Susanne Coleman, et al, 2012). Patients with chronic conditions such as spinal cord

injury, diabetes mellitus, cardio-vascular diseases, malnutrition are the most affected by pressure ulcers(Epuap, 2009; Islam, Sae-Sia and Khupantavee, 2010; Adegoke *et al.*, 2013; Coleman *et al.*, 2014; European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel, 2014; Gedamu, Hailu and Amano, 2014; Sheila Grossman, 2014). Existence of shearing force is also another risk factor for pressure ulcers development. Shearing force is “caused by the sliding of one tissue layer over another with stretching and angulations of blood vessels, causing injury and thrombosis”. It occurs when the skeleton moves, but the skin remains fixed to an external surface, such as occurs with transfer from a stretcher to a bed or pulling a person up in bed (Sheila Grossman, 2014).

2.4 Pressure ulcers preventive practices

Preventive practices are summarized in five main preventive activities(European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel, 2014). They include: skin assessment, risk assessment, skin care, nutritional support, mechanical load management and health education to all parties involved in the prevention of pressure ulcer development.

Risk of developing PU assessment and Skin assessment

The National Pressure Ulcer Advisory Panel , European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance in their guide on prevention and treatment of pressure ulcer, they strongly recommend assessing the risk of developing the pressure ulcer as soon as possible, no later than eight hours following patient admission or at community visit. They also recommend continuous assessment mainly when the patient’s condition occurs. For the patient with acute care needs, the assessment should be done on admission and reassessment every 24 hours and above.

For patients in long term care settings, the risk of developing pressure ulcer and skin assessments are done on admission and reassessment may be done on a weekly basis and beyond depending on patient’s status(European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel, 2014).

A complete skin assessment should be done for every risk assessment to rule out any alteration in the skin integrity and all risk assessment findings should be documented including: impaired activity and mobility, the skin intactness, skin color, temperature, edema, existence of medical devices (IV lines, drain, oxygen facial mask, saturemeter cables, ECG leads, etc) under and surrounding tissues status increased skin moisture, any existing pressure ulcer and surrounding tissues consistency change such as decreased skin perfusion and oxygenation (Epuap, 2009). Other factors such as increased age, malnutrition, anemia and any other patient's critical condition should also be noted(Epuap, 2009).

Institute of Health Care improvement's (IHI's) clinical guideline (*How -to guide: Prevent Pressure ulcers*) about pressure ulcer prevention also goes in line with NPUAP, EPUAP and PPP clinical recommendation on pressure ulcer prevention with slight difference on appropriate time necessary to assess all individual at risk for developing pressure ulcers. For IHI's *How -to guide: prevent pressure ulcers*, a pressure ulcer admission assessment combining both risk of developing pressure ulcer assessment and the assessment of the skin should be done within first four hours of admission while this time is extended until eight hours of patient admission in NPUP, EPUAP and PPP clinical recommendations. The IHI's *How to guide: prevent pressure ulcer*, also recommend reassessing the risk of developing pressure ulcers for all patients on a daily basis (Institute for Healthcare Improvement, 2011).

To identify and evaluate the individuals at risk of developing pressure ulcer, the NPUAP, EPUAP and PPP recommend using existing reliable and valid tools of predicting pressure ulcer risk of development. Many different scales have been developed to help the health professionals. The most known are the Braden scale, Norton scale, Waterlow scale, Gosnell scale and Knoll scale (Institute for Healthcare Improvement, 2011; Ingwu, Ayanor and Ohaeri, 2015).

The Braden scale is the most used in United States of America and some health institutions such as King Faisal and Kigali University teaching Hospital (CHUK) in Rwanda use the Braden scale. The NPUP, EPUAP AND PPIA recommend Health care settings to put in place policy and protocols regarding pressure ulcer risk assessment, avail different tools to be used and provide in service training to all health care providers regarding PU prevention (Institute for Healthcare Improvement, 2011; AHRQ, 2013; Balzer and Kottner, 2015). For incontinent bedridden patient, (either urinary or fecal incontinence,) a bladder and bowel program should be put in place. Their skin should be cleaned and dried at the moment of dirtying and the topical barrier usage is considered to protect the skin. Factors such as wetness or moisture and cold air should be assessed and avoided as they lead to dry skin and increase the risk of developing pressure ulcer (Institute for Healthcare Improvement, 2011).

Nutritional support

The research finding revealed that balanced diet with enough carbohydrates(30 to 35 kcalories/kg body for individuals at risk of nutritional deficiency and at risk of a pressure ulcer development), proteins (1,25 to 1,5gr of protein to individual at risk of developing pressure ulcer), mineral salt, vitamins and enough fluid have a great benefit to the patients with pressure ulcers to strengthen the skin integrity and assist in healing of existing pressure ulcer (preventing it from developing in other form/category of PU).

For further prevention of pressure ulcers, the NPUAP, EPUAP & PPP recommend to consider the use of some emerging therapies such as: microclimate control, prophylactic dressings, use of silk-like fabrics rather than cotton or cotton-blend fabrics and the use of electrical stimulation of the muscles in spinal cord injured individuals (NPUAP, EPUAP & PPP, 2014).

Mechanical load management:

According to Agency of health care research and quality (AHRQ) and NPUAP and other international agencies for PU prevention and management, bedridden patient

should be turned every two hours and every hour for chair-bound persons while avoiding to put him/her on prominent/bony areas or existing erythema. They recommend to post a written paper indicating the turning schedule on the patient's bed or anywhere for easy view and access.

The research done in united state of America revealed that utilization of risk assessment tool for predicting pressure ulcers and turning the patient on regular basis are one of the key preventive measures of pressure ulcer development among bedridden patients.

Another comparative study done in teaching hospital of Korea revealed that Position change was the most performed nursing practice to prevent PU development followed by skin care. The same study revealed majority of nurses were tending to frequently provide the skin care and nutritional care in the at-risk group than in the pressure-ulcer group (Cho, Park and Chung, 2011).

Health care providers have to consider patient's conditions, alignment, balance, stability, and weight distribution while turning the patient in the bed or positioning him/her in a wheel chair. Fifteen minute is a reasonable time for weight shift among chair bound persons and whenever possible they should be thought how to do these themselves if they can. (European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel, 2014).

Pressure should be minimized as much as possible by using pressure equalizers or redistributing pressures surfaces such as standardized mattress: air mattress, overlay mattress, and chair cushion surfaces. Donut-type devices and sheepskin for pressure redistribution are avoided. Lifting devices such bed linen, trapeze or others are used to move the patient while avoiding dragging him/her during transfer or position change to prevent shears. Pillows, blankets; foam wedges are used to protect bony prominences from direct contact with each other.

The skin under medical device is regularly assessed to prevent pressure. In conscious and cooperative patients, pillows are placed under the patient's calf to raise the heels of the bed. Patient's head is kept at or below 30° to minimize the pressure(AHRQ, 2013).

Pressure ulcer prevention and management require a multidisciplinary collaboration. Inclusive educational program involving health care providers, patients and family caregivers should be planned, implemented, monitored and evaluated to reduce PU incidence and prevalence.

For this reason, health providers and caregivers should be equipped with specific knowledge and skills regarding pressure ulcers prevention and management. Appropriate documentation of relevant data should also be assured to improve the quality of care provided in relation to pressure ulcer prevention.

2.5. Nurses ‘knowledge, attitude and practices regarding PU prevention

The findings of a research done in six public hospitals in Addis Ababa in 2015, revealed an overall moderate level of nurses ‘knowledge about pressure ulcer prevention (63, 85%). Participants’ knowledge was high in some aspect of PU prevention such as PU development risk factors (the importance of adequate diet the importance of education to reduce the incidence of pressure ulcer and the importance of maintaining patient’s skin clean and dry. However, participants had low score in other aspect of knowledge such as PU staging, assessment and management of PU (Ingwu, Ayanor and Ohaeri, 2015)

Inadequate nurses’ knowledge and practice on pressure ulcer prevention have been also confirmed by Nuru et al, (2015) in their research in Ethiopia. They discovered a positive association between educational background, experience and knowledge of PU prevention. In addition to this, they found that nurses’ dissatisfaction with nurses’ leadership, insufficient equipment, and limited number of nursing staff strongly impede the practices of PU prevention (Nuru et al, 2015).

The findings also showed a strong association between nurses’knowledge and their level of education and working experience. Those with diploma were 0,18 less knowledgeable than those with second degree. Again the more nurses were experienced the more they were knowledgeable about pressure ulcer prevention. (Ingwu, Ayanor and Ohaeri, 2015)

A non-experimental cross sectional descriptive survey done in Nigeria by Uba Markus et al (2015), also revealed nurses 'overall low level of knowledge (61.78%, N=99). Limited formal educational background and lack of in service training were attributable factors to the overall low level of nurses whereby only 6.1% were bachelor's degree holder with the majority of nurses (93.9%) having basic nursing diploma. In the same year (2015) research done in Bangladesh revealed similar findings. The level of nurses' knowledge regarding pressure ulcer prevention was at very low level (M = 57.79%, SD = 9.20%, N=91)(Islam, Sae-Sia and Khupantavee, 2010). In addition to this low level of knowledge, the overall practice were also moderate (M=77.55%, SD=11.00%) and it revealed that the identification of factors for PU development, adequate nutrition to maintain healthy skin , management of mechanical load , use of risk assessment tool and educational program for patient, family, and staff were done moderately on average of 77.65%,77.41%, 77.65%, 74.17%, 75.09% respectively.

Another observational study done in two German hospitals in 2015 showed that in regards to application of PU preventive practices, the most carried out practices were cleaning the patients skin and minimizing exposure to moisture. For this, more that 90% of patient were benefitting these kind of preventive cares (Hoviattalab *et al.*, 2014) .

The research conducted in Jordan, 2013 showed that the nurses had an overall positive attitude towards pressure ulcers prevention by perceiving that all patient are at risk for developing PU (56% agreed, 25 %strongly agreed) and they believed that continuous nursing assessment of patients would give an accurate account of their PU risk (82%; n=197). They also thought that most PUs could be avoided (82%; n=198) and they believed that they should be concerned with PU prevention during their practice (79%; n=190). The same research findings also revealed that the nurses' positive attitude was influenced by their experience. The more a nurse had many years of working the more his/her attitude was positive and the staff shortage (86.2%). Time (83.6%) and patient conditions (68.6%) were found to be their major barriers to the practice of PU preventive measures.

Other research done in Uganda showed a limited nurses' knowledge in terms of PU staging, need for balanced diet and the existence of standardized tool for risk assessment were completely ignored (Mwebaza *et al.*, 2014). The most barriers to the implementation of the existing known preventive practices were the shortage of the staff, poor access to up to date literature on PU prevention, limited provision of pressure relieving materials and limited usage of risk assessment scales (Mwebaza *et al.*, 2014).

A randomized cross-sectional, observational multicenter study done in 14 Belgian Hospital also showed inadequate nurses' knowledge (Mean score = 49.7%) about prevention of pressure ulcers and a significant correlation between nurses' attitude (Mean= 71.3%,) and application of preventive practice ($OR = 3.07, p = .05$) were identified. No Correlation found between Knowledge and application of preventive practices (Demarre *et al.*, 2015). The same research findings also revealed a significant association between the nurses 'level of education and their knowledge. Those with certificate scored significantly lower than those with bachelor's degree (47.7% vs. 51.5%, $t = -2.97, df = 529, p = .003$). An association was also found between additional training about PU prevention and Nurses 'knowledge. Those who received the training scored higher than those who did not (51.3% vs. 47.7%, $t = 3.17, df = 551, p = .002$).

The themes like "risk assessment" (35.6%), "reduction of the magnitude of pressure and shearing" (43.9%), "observation and classification" (48.4%), and "etiology and development" (50.0%) were not generally known and a little number of nurses (26.0%) were aware of lack of oxygen in the tissues as cause of Pressure ulcers.

Another research done by Abebe Dilie and Daniel Mengistu in Addis Ababa, government hospital Ethiopia in 2015, showed that 68.4% of participants had favorable attitudes towards prevention of pressure ulcer. Sharifuet al, (2010) in his research done in Bangladesh also found that the nurses attitudes about pressure ulcer prevention was moderate (M = 78.31%, SD = 6.61 %,) and he found a moderate correlation between attitudes and practices (Islam, Sae-Sia and Khupantavee, 2010).

A study done in public hospital Ethiopia Addis Ababa in 2015 and published in 2017 about nurses' knowledge and perceived barriers to prevent pressure ulcer revealed that the majority of participated nurses had unsatisfactory knowledge (63.85%, N=356) (Ebi, Menji and Hunde, 2017).

2.6. Conceptual Framework of the Study

The conceptual framework of this study was developed basing on Bloom's cognitive taxonomy also called Bloom's educational objectives or simply called Bloom taxonomy. Bloom's cognitive taxonomy can be defined as a scientific way of ordering the human being learning expertise, developed by Benjamin Bloom in 1956 and modified by Anderson and Krathwohl in 2001 (Anderson, Lorin W., Krathwohl, David R., 2001 & Linda Dunegan, 2011).

This model is the most universally used and provides a way to organize different form of human thinking into six levels, starting from the easiest and most basic to the most difficult and from the tangible to the intangible”(Forehand. M., 2005)

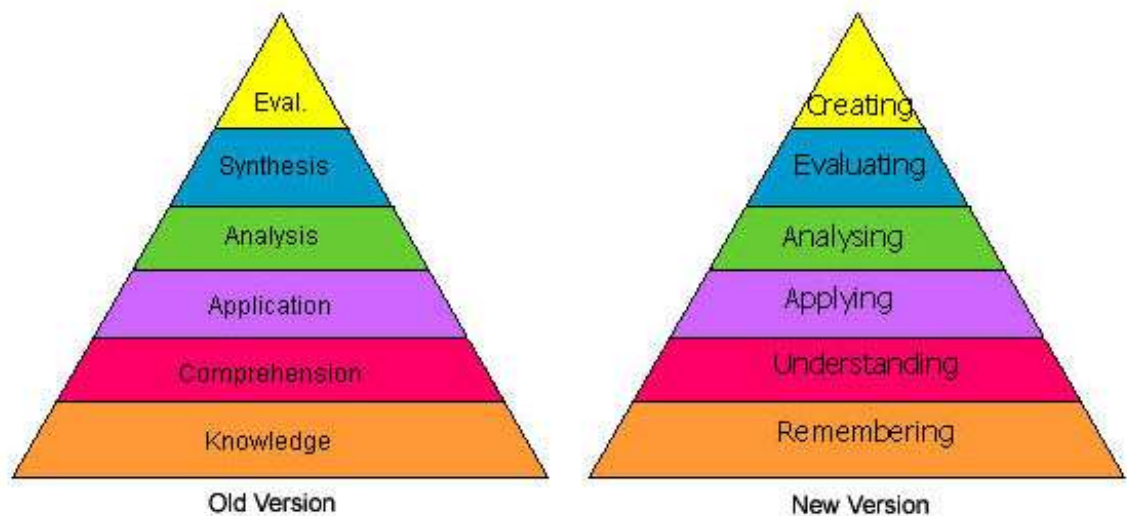


Figure 1. Bloom taxonomy: old and new version.(Forehand. M, 2005)

Bloom's Taxonomy

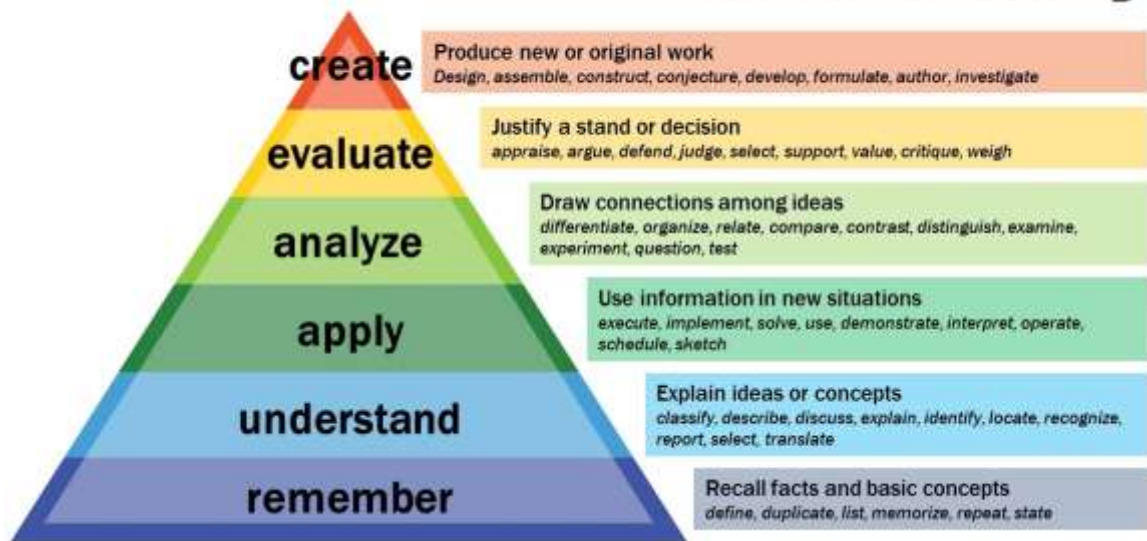


Figure 2. 1 Bloom taxonomy: revised version with explaining verbs (Forehand. M, 2005)

The bloom taxonomy categorizes six educational goals, using nouns: Knowledge, comprehension, application, analysis, synthesis and evaluation. Considering this as knowledge hierarchy, the lowest level of knowledge starts with simple remembering of facts to high level of creating and put elements together to form a coherent or functional whole (Anderson, Lorin W. & Krathwohl, David R. ,2001)

Bloom Benjamin classified knowledge into three major domains: Cognitive, affective and psychomotor domains. He then clarifies that for learning to take place, knowledge (Cognitive) should be a critical prerequisite to acquire practical skills and abilities (psychomotor) and the learner should display positive attitude (affective) towards learning process. Trying to analyze the learning process, Bloom further explained the role of the environment and learner characteristics in the learning process. Therefore, a conducive environment and motivated learner would be the factors that facilitate learning.

In the current study, the researcher adapted the Bloom taxonomy of educational objectives and adapted it. Knowledge, attitude, and practice are the main related dependent variables and fall into three domains of human learning expertise: cognitive, affective and psychomotor domains respectively (Krathwohl, 2016) . The cognitive and psychomotor domains regarding PU prevention from start with the lowest level of remembering and understanding (1st and 2nd level) basic concepts concerning pressure ulcer (such as PU staging, risk factors, risk assessment, needed nutritional support to maintain healthy skin and foster wound healing) to the level of applying the acquired knowledge in provision of the skin care, management of mechanical loads and shears and in giving health education to patients, family and care givers. The high levels such as analyzing, evaluating and creating are also concerned as far as the nurses have to examine, imitate and judge the clinical situation of both the patient and the working environment. This will help him to create solutions or alternatives in preventing pressure ulcers. The nurses' values reflecting the affective domain are very important as far as PU prevention is concerned. The will influence and determine how nurses respond to different cases that need PU prevention.

When writing his taxonomy, Bloom did not display the factors influencing three domains of learning; however he explained the importance of environment and learner characteristics in the process of learning. Therefore, in this study socio-demographic and participants characteristics were also discussed to assess their relationship with KAP regarding PU

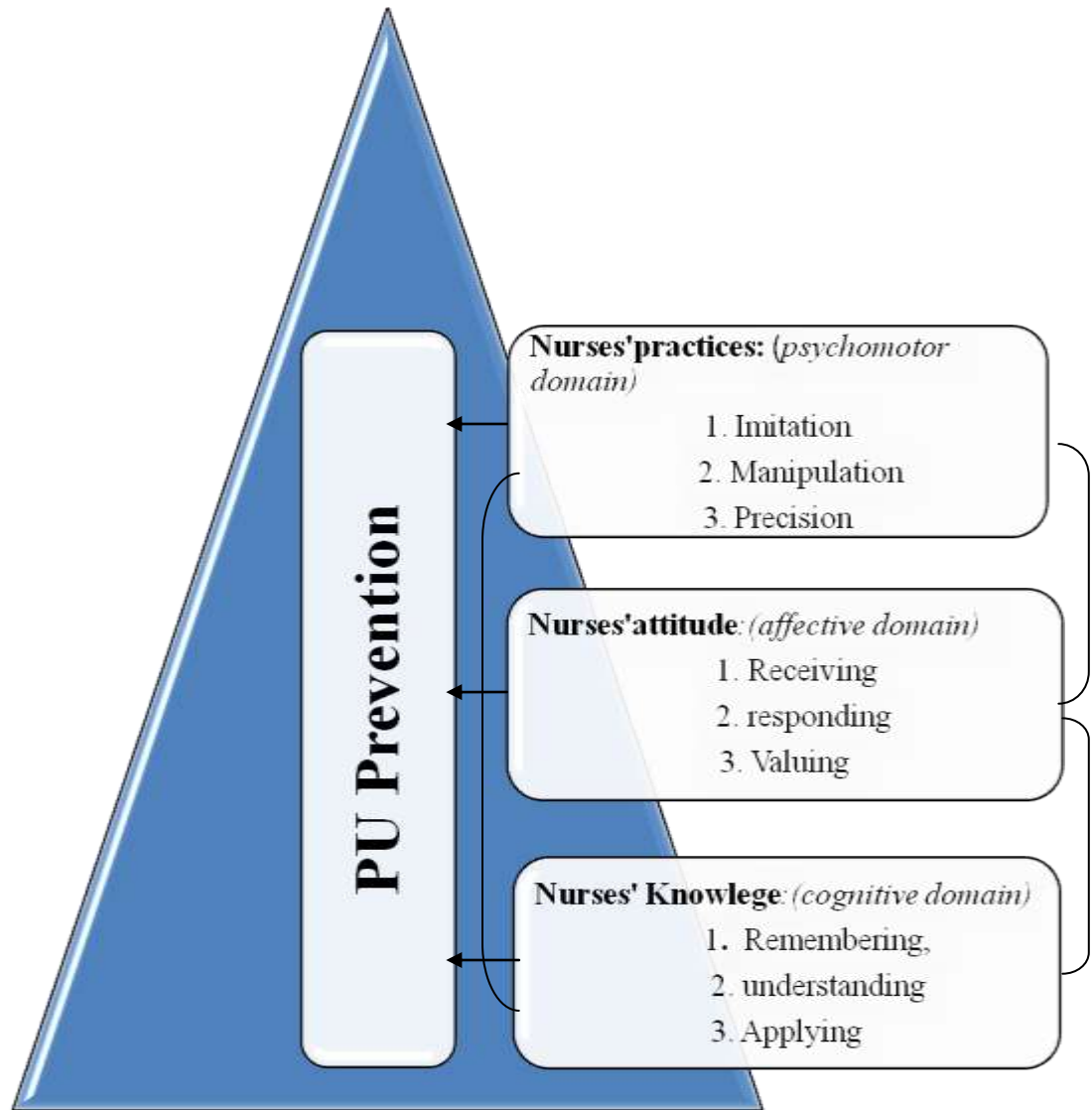


Figure 2. 3. Conceptual framework of nurses ‘knowledge, attitudes and practice on pressure ulcer prevention adapted from Bloom taxonomy of educational objectives. (Bloom, 1956)

2.4 CONCLUSION

In the light of the above literature, it was noticed that most of studies and available literature in the area of KAP regarding PU were done in developed world. Few studies done in Africa were limited in Nigeniria and Ethiopia.

There is little evidence in Rwanda and East Africa. In addition to that, the factors associated with KAP differ from one study to another. Furthermore, most studies were done in a single hospital setting and were not considering the entire population. Therefore, using the entire population in the study setting, this study documented local context evidence about KAP regarding PU and different factors associated with KAP were identified.

CHAPTER THREE. METHODOLOGY

3.0 INTRODUCTION

This chapter describes the methodology used. It describes the study area, study design, study population, study sample, sampling strategies, ethical considerations, data collection methods, and procedure used. It also indicates how data were analyzed. Of course possible problems and limitation encountered were numbered.

3.1 STUDY AREA

This study was conducted in Kibagabaga hospital, one of the district hospitals located in the Kigali city, Gasabo district, Kimironko sector and Kibagabaga cell in Rwanda. It is situated at 3kilometers from Kimironko market. This hospital has a capacity of 120 beds and receives an average of 230 patients per day. Each year, the hospital receives an average of 1700 referred cases. Around 900 cases are moved to teaching hospitals. The hospital has 5 specialists (three gynecologists and two surgeons) 13 general medical physicians, 128 nurses and 265 staff. This hospital also initiated adult (in 2008) and pediatric pain relief and palliative care programs in 2009.

3.2. STUDY APPROACH AND DESIGN

To meet the research objectives, a quantitative research approach and cross-sectional descriptive design was used. This is a design whereby data are collected at one point in time (or multiple times in a short time period,) for describing phenomena at a fixed point. (Polit and Beck,2014).

3.3. STUDY POPULATION

The population of this study comprised all bedside nurses working in all services that admit patients including medical-surgical(Surgical service, internal medicine service, accident and emergency service, outpatient consultation and palliative care services), pediatric and Maternal-child health services(Labor ward, post partum and neonatal services) at Kibagabaga district hospital.

3.4. SAMPLING METHOD

This study used the total population sampling method, a type of purposive sampling technique and it examined the entire population nurses admitting and caring for adult and pediatric patients with or at risk of pressure ulcers. This included nurses working in internal medicine, surgical service, accident and emergency, outpatient consultation and palliative care services, labor ward, post partum ward and neonatal ward at Kibagabaga District Hospital.

3.5. SAMPLE SIZE

This consisted of all 128 registered nurses (entire nursing population) working in the mentioned services and who were willing to participate in the study.

3.6. INCLUSION AND EXCLUSION CRITERIA

All nurses working in medical-surgical, pediatric, Maternal-child health services at Kibagabaga district hospital, who were present in the period of the study (from March to May, 2017) and who were willing to participate, were included in the study. The nurses who were in their annual or maternity leaves and those who were not willing to participate were excluded from the study.

3.7. DATA COLLECTION, METHOD AND PROCEDURES

After getting the ethical clearance from CMHS/IRB and the permission from the Kibagabaga District hospital administration, the researcher worked collaboratively with the director of nursing and the unit managers, to easily reach the participants. The nurses were approached during their morning staff meeting; the researcher explained the research title and its main purpose as well as the inclusion and exclusion criteria to participate in the study. The consent form was signed by each nurse who was willing to participate in the study. Then, self-structured questionnaire with two versions of English and Kinyarwanda was administered and each participant had an option to respond in one of those languages. The participants were requested to individually fill in the questionnaire without consulting a third reference (colleague, book or internet) and use their free time such as lunchtime. The researcher scheduled three days a week; Monday, Wednesday and Friday, to gather filled in questionnaires.

After completing the questionnaire the participant was asked to keep it while waiting for the researcher to come.

DESCRIPTION OF THE TOOL (QUESTIONNAIRE)

The questionnaire used in the present study has 4 main sections:

The first section has seven items concerning socio-demographic data and characteristics of the participants. These include: sex, age, area of clinical practice, level of education (A₂, A₁, A₀&others) position (registered nurses, enrolled nurses, nurse educators, and specialists nurse in any field), and PU prevention and management training status(participants were asked to indicate whether they had attended any training on PU prevention and management).

The second section measure nurses' knowledge regarding pressure ulcer prevention, staging, and wound description. The researcher used a known, public and validated available tool of Pieper Pressure Ulcer Knowledge Test. (Pieper and Moton,1959). The tool has 39 items of yes, no, I don't know.

With the provided marking scheme by the author of this tool, the respondents' filled in questionnaires were corrected and the obtained marks out of 39 was put on hundred. The level of knowledge was judged according to McDonald's standard of learning outcome which classify the level of knowledge into five categories as follow (McDonald, 2002) 90%-100% showed a very high level of knowledge, 80%-89,99% showed a high level of knowledge, 70%-79, 99% showed a moderate level of knowledge, 60%-69, 99% showed a low level of knowledge, And a percentage below 60% showed a very low level of knowledge.

The third section has 11 items describing the nurses 'attitudes regarding pressure ulcer prevention. The researcher used the validate "Staff Attitude Scale" adapted from a scale used by Moore and Price which is also an a scale open to the public (to use the instrument does not require permission). Each item has 5 point scoring system ranging from strongly agree to strongly disagree." Here, "strongly disagree" = 5 points, "disagree" = 4points, "Neither agree nor disagree"=3 points, Agree=2 points and "Strongly agree"=1point. For the questions number 1, 6, 7, and 11 the scoring is reversed whereby, "strongly disagree"= 1 and so on. A total score less than 40 out of 55 were considered as negative attitudes while that above 40 were considered as positive attitude (Moore Z, Price P, 2004).

Finally the nursing practices regarding PU were measured using "Facility Assessment Checklist" a public and validated tool with 29 items developed by Partners of Rhode Island to determine if the facility has a process for developing and implementing a pressure ulcer care plan for patients who have been found to be at risk or who have a pressure ulcer and to identify areas that need improvement". (Quality Partners of Rhode Island) This tool originally consisted of multiple-choice questions with "Yes", "no", "responsible person" and "comment" as options but after adaptation, only "yes" or "no" remained as options.

After correction of the participants' copies (questionnaires), the obtained marks out of 29 was put on hundred and then mean score, percentage were provided. The

McDonald's standard of learning outcome was used to interpret the level of practice as either low or high as follow.(McDonald, 2002): A percentage of 60% indicated a very low level of practices, A percentage of 60%-69,99% indicated a low level of practices , A percentage of 70%-79,99% indicated a moderate level of practices, A percentage of 80%-89, 99% indicated a high level of practices, A percentage of 90%-100% indicated a very high-level of practices.

3.8. VALIDITY AND RELIABILITY

The validity of a research tool refers to the extent to which a tool really measures what it intends to measure (Polit and Beck, 2014). Content validity refers to extent to which an instrument is made of appropriate items for the concept to be measured (Polit and Beck, 2014). In the current study, content validity was assured by checking items in the data collection tool against the study objectives and concepts in the conceptual framework to ascertain whether they measured all elements to be investigated. The table below shows the content validity which highlights items of measurement corresponding to the study objectives and conceptual framework.

Table 3. 1. Content validity

Objectives	Conceptual framework	Questionnaire
To describe the level of knowledge regarding pressure ulcer prevention	<i>Cognitive domain:</i> Recalling /remembering and understanding basic concepts in regards to PU prevention	Section II : statements:1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20,21,22,23,24,25,26,27,28,29,30,31, 32,33,34,35,36,37,38,39.
To identify the nurses 'attitudes regarding pressure ulcer prevention	<i>Affective domain</i> Perceiving, responding and valuing concepts and importance of PU prevention	Section III: statements: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, And 11.
To determine the nurses practices regarding pressure ulcer prevention	<i>Psycho-motor domain</i> Implement acquired knowledge(known basic concepts)of PU staging, risk assessment, and preventive measures	Section IV : statements:1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11,12,13,14,15,16'17,18,19,20,21,22 ,23,24,25,26,27,28 & 29.
To assess socio-demographic factors associated with knowledge, attitude and practice of nurses towards pressure ulcer prevention	According to Bloom, for learning to take place, they are different factors that should be taken into consideration such as individual, environmental and so on.	Section I: Questions: 1,2,3,4,5,6 &7

The reliability has been defined by Polit and Beck (2014) as the degree of consistency or accuracy to which an instrument measures an attribute.

To test reliability, the questionnaire was examined by the researcher and her supervisor and a pilot study was done to confirm its understandability by participants to obtain consistent results.

Ten nurses accepted to participate in the pilot study and they were finally withdrawn from the current research participants. Pieper Pressure Ulcer Knowledge Test (PPUKT), The Staff Attitude Scale and the Facility Assessment Checklist were used in the current research and have been proven to be reliable and valid. After the pilot study the researcher calculated the Cronbach's Alpha of the instrument and it was found to be 0.83, 0.54 and 0.69 respectively.

3.9 DATA MANAGEMENT AND ANALYSIS

3.9.1 DATA MANAGEMENT

Data was kept in a secured area where by only researcher and her supervisors will have access. These data (filled questionnaires) will be kept confidential and secured for a maximum period of five years thereafter to be finally burnt. The data on the computer is password protected

3.9.2 DATA ANALYSIS

The Statistical Package for the Social Sciences (SPSS version 21) was used for data entry, cleaning and analysis.

Descriptive statistics using frequency tables were used to summarize demographic characteristics. Calculation of mean scores and standard deviation calculations were also performed to summarize data related to nurses' knowledge, attitudes and practices towards PU prevention and management. Total knowledge scores were calculated by adding up the corresponding items. Possible minimum and maximum scores were reported. The total score was then calculated per cent for each of the subscales of knowledge and for the nurses' scores on their practices towards PU prevention and management. One-way ANOVA test was performed to compare multiple means. Independent samples t-test was also used to compare two mean scores for the variables of gender and in-service training.

Pearson correlation coefficient (r) was calculated to test the correlation between nurses' knowledge, attitudes and practices. A p-value of 0.05 was considered as significant.

3.10. LIMITATION TO THE STUDY

This study was a cross section study and participants were recruited from a single hospital which resulted in non-generalizable research findings. The study also used a self-administered questionnaire, and the results may introduce a bias and may not reflect the actual knowledge and practices of PU prevention at the study settings.

3.11. ETHICAL CONSIDERATIONS

The researcher presented a research proposal to the CMHS research Committee to obtain ethical clearance approval. The researcher also obtained the permission from the Hospital Research Ethic Committee. Written informed consent was signed by each participant as a proof of his/her voluntary participation in the study. They were informed that they had the right to accept to participate in the study or to refuse to do so. They were also explained that they have the right to withdraw from the study at any time without any penalty. They also had the right to ask any question or report any concern about the study. They were informed that the information provided will be kept anonymous and confidential at all times and will be only used for the purpose of the current study.

The participants were explained that there would be no risks from participating in the study as described in the consent form: no mistreatment or any other consequences. Some benefits from participation in the study were explained. This included to be aware of own level of knowledge, attitudes and practices regarding pressure ulcers prevention, to contribute to the improvement of quality care in terms of PU prevention through facilitating to find out the gap and to finally overcome them. Each participant was given a code number for identification to maximize the privacy and confidentiality.

CHAPTER FOUR: RESEARCH FINDINGS

4.0. Introduction

This chapter summarizes the research findings regarding Nurses' Knowledge, Attitudes and Practices towards the prevention of pressure ulcers from nursing staff working at Kibagabaga district hospital in Rwanda. On one hundred and twenty eight (128) questionnaires distributed to participants, between 15th March to 15th May 2017, one hundred and two (102) questionnaires were filled in and returned back to the researcher. This represented a response rate of 80%. The results were presented in tables.

4.1. Socio-demographic characteristics

Data related to participants were recorded by the study. Table 4.1 summarizes socio-demographic characteristics of the study participants. These characteristics indicate that more than four out of five participants (83.3%) were female participants. The findings also indicate that with regard to marital status 80 participants (78.4%) were married. In addition, 71 participants (69.6%) worked in the medical surgical unit, while the remaining participants originated from the pediatric ward and the maternal-child health services. The study involved participants who were between 26 and 52 years old, with a mean age of 35.29 years (± 6.30); the age group of 30-34 accounted for most participants (46.1%). Participants had long work experience. The mean work experience of participants was 9.62 years (± 4.94), and the majority of participants (56.9%) had been working 6 to 10 years. Advanced level was the mostly completed level of education (67.6%), and nearly one out of four participants (24.5%) had secondary education. Lastly, the study indicated that most participants (97.1%) had not received in-service training related to PU prevention and management.

Table 4. 1: Socio-demographic characteristics of participants (N=102).

		Frequency	Percent
Sex	Female	85	83.3
	Male	17	16.7
	Total	102	100.0
Marital status	Single	20	19.6
	Married	80	78.4
	Widow	2	2.0
	Total	102	100.0
Working service	Medical-surgical service	71	69.6
	Pediatric ward	15	14.7
	Maternal-child health service	16	15.7
	Total	102	100.0
age group (years)	Mean= 35.29 years (SD=6.302)		
	25-29	12	11.8
	30-34	47	46.1
	35-39	21	20.6
	40-44	11	10.8
	45 & above	11	10.8
	Total	102	100.0
	Work experience (years)	Mean= 9.62 years (SD=4.943)	
5 years or less		16	15.7
6-10		58	56.9
11 & above		28	27.5
Total		102	100.0
Highest level of education	Secondary level	25	24.5
	Advanced level	69	67.6
	Bachelor level	8	7.8
	Total	102	100.0
In-service training about PU prevention and management	Yes	3	2.9
	No	99	97.1
	Total	102	100.0

4.2. Nurses' knowledge towards PU prevention, classification and management

The knowledge of nurses towards PU prevention and management was assessed using 39 items. Participants had to indicate whether each of these items was either true or false, or indicate that they did not know. Answers were coded in correct or wrong answers with reference to the pre-established marking guide. According to the latter, items number 5, 6, 10, 12, 13, 16, 17, and 19 had to be indicated as false whereas the remaining ones were to be indicated as true by participants. The correct answers were recorded as 1 whereas the wrong answer was recorded into 0. Therefore, for each item, the minimum score was either 0 or 1. After recoding participants' answers into correct and wrong answers, the mean score and standard deviation were calculated for each item as displayed in Table 4.2.

Table 4. 2 Nurses' knowledge of PU prevention and management by item(N=102)

Variable	N	Mean	Std. Deviation
Stage I pressure ulcers are defined as intact skin with non-blanchable erythema in lightly pigmented persons.	102	.90	.299
Risk factors for development of pressure ulcers are immobility, incontinence, impaired nutrition, and altered level of consciousness	102	.99	.099
All hospitalized individuals at risk for pressure ulcers should have a systematic skin inspection at least daily and those in long-term care at least once a week.	102	.83	.375
Hot water and soap may dry the skin and increase the risk for pressure ulcers.	102	.18	.383
It is important to massage bony prominences.	102	.46	.501
A Stage III pressure ulcer is a partial thickness skin loss involving the epidermis and/or dermis.	102	.25	.432
All individuals should be assessed on admission to a hospital for risk of pressure ulcer development.	102	.37	.486
A Stage IV pressure ulcer is a full thickness skin loss with extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structure.	102	.99	.099
An adequate dietary intake of protein and calories should be maintained during illness.	102	.94	.236
Persons confined to bed should be repositioned every 3 hours	102	.23	.420
A turning schedule should be written and placed at the bedside.	102	.93	.254
Heel protectors relieve pressure on the heels.	102	.07	.254
Donut devices/ring cushions help to prevent pressure ulcers.	102	.05	.217
In a side lying position, a person should be at a 30-degree angle with the bed unless inconsistent with the patient's condition and other care needs that take priority.	100	.29	.456

Variable	N	Mean	Std. Deviation
The head of the bed should be maintained at the lowest degree of elevation (hopefully, no higher than a 30 degree angle) consistent with medical conditions.	102	.81	.391
A person who cannot move him or her should be repositioned every 2 hours while sitting in a chair.	102	.02	.139
Persons who can be taught should shift their weight every 30 minutes while sitting in a chair.	102	.10	.299
Chair-bound persons should be fitted for a chair cushion.	102	.65	.480
Stage II pressure ulcers are a full thickness skin loss.	102	.77	.420
The epidermis should remain clean and dry.	102	.45	.500
The incidence and prevalence of pressure ulcers are so high that it would be better if the institution appoint a team to study risk factors, prevention, and treatment.	102	.41	.495
A low-humidity environment may predispose a person to pressure ulcers.	102	.38	.488
To minimize the skin's exposure to moisture on incontinence, underpads should be used to absorb moisture.	102	.43	.498
Slough is yellow or creamy necrotic tissue on a wound bed.	102	.18	.383
Bony prominences should not have direct contact with one another	102	.85	.356
Every person assessed to be at risk for developing pressure ulcers should be placed on a pressure-redistribution bed surface.	102	.82	.383
Blanching refers to whiteness when pressure is applied to a reddened area.	102	.75	.438
A pressure redistribution surface reduces tissue interface pressure below capillary closing pressure.	102	.78	.413
Skin macerated from moisture tears more easily.	102	.44	.499
A pressure ulcer scar will break down faster than unwounded skin.	102	.89	.312
A good way to decrease pressure on the heels is to elevate them off the bed.	102	.41	.495
All care given to prevent or treat pressure ulcers must be documented.	102	.94	.236
Devices that suspend the heels protect the heels from pressure.	102	.78	.413
Shear is the force that occurs when the skin sticks to a surface and the body slides.	101	.25	.434
Friction may occur when moving a person up in bed.	102	.74	.443
A low Braden score is associated with increased pressure ulcer risk.	102	.25	.432
Stage II pressure ulcers may be extremely painful due to exposure of nerve endings.	102	.62	.488
For persons who have incontinence, skin cleaning should occur at the time of soiling and at routine intervals.	102	.91	.285
Educational programs may reduce the incidence of pressure ulcers.	102	.45	.500

After coding participants' answers as correct or wrong answers, a total score of their knowledge was calculated by adding up the scores for 39 items. Thereafter, total individual scores were transformed into percentages. It is the percent score that allowed to classify the participant's knowledge into any class as displayed in Table 4.3. Overall, participants had a very low level of knowledge (mean= 55.34, SD=9.87). According to Table 4.3, more than three out of 4 participants (77.8%) had a very low knowledge towards PU prevention, classification and management. The number of participants decreased as the percent score increased. No single participant had a very high score of knowledge (90-100).

Table 4. 3 Nurses' knowledge class according to McDonald classification (N=102).

Percent score group	Mean=55.34 (\pm 9.87)	Frequency	Percent
Very low (<60%)		77	77.8
Low (60.0-69.9%)		15	15.2
Moderate (70.0-79.9%)		6	6.1
High (80.0-89.9%)		1	1.0
Total		99	100.0

4.2.1. Nurses' knowledge in regards to their marital status

To compare the knowledge score of females to that of males, an independent samples t-test was performed. It was revealed that male nurses' score (n=17, mean=60.03, SD=9.11) was significantly higher than that of female nurses (n=82, mean=54.37, SD=9.80), $t(97)=-2.189$, $p=0.031$. The analysis of the knowledge score per marital status was done using one-way ANOVA. This test yielded significant differences between the mean score of single (n=20, mean=58.84, SD=9.96), married (n=77, mean=55.24, SD=7.53) and widow nurses (n=2, mean=24.35, SD=34.44), $F(2,96)=14.064$, $p<0.001$. Widow Nurses scored significantly lower than single and married nurses as showed by the post hoc test (Bonferroni) results in Table4.4.

Table 4. 4: Bonferroni test results of multiples comparisons of mean score per marital status (p values <0.001) (N=102)

Marital status	Single	married
Married	0.316	
Widow	<0.001	<0.001

4.2.2. Nurses' knowledge per socio-demographic characteristics

Table 4. 5. Nurses' overall knowledge per socio-demographic characteristics and knowledge dimensions (N=102)

Variable		Overall knowledge			PU staging & description		Risk factors		Risk assessment		Mechanical load management		Preventive practice & strategies	
		N	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Sex														
	Female	82	54.38	9.80	62.52	16.34	54.25	17.71	46.67	25.82	44.75	14.07	56.63	12.79
	Male	17	60.03	9.11	68.91	14.49	59.66	19.06	56.86	25.72	51.26	13.42	60.78	10.51
	Total	99	55.35	9.88										
	p-value		.031*		.138		.259		.140		.083		.212	
Marital status														
	Single	20	58.85	9.96	65.00	19.92	60.71	16.63	60.00	27.78	43.57	17.01	62.00	12.25
	Married	77	55.24	7.54	64.11	13.64	54.61	17.23	45.83	24.52	47.07	12.42	57.00	10.71
	Widow	2	24.36	34.45	28.57	40.41	21.43	30.30	33.33	47.14	21.43	30.30	23.33	33.00
	Total	99	55.35	9.88	63.59	16.16	55.16	17.96	48.37	25.96	45.86	14.11	57.32	12.49
	p-value		.000*		0.007		0.100		0.064		0.027*		0.000*	
Working service														
	Medical-surgical	69	54.96	10.17	65.59	14.80	54.12	17.57	43.19	22.81	45.55	13.70	57.00	13.03
	Pediatric ward	14	57.69	8.09	55.24	18.60	61.22	20.53	71.11	30.52	50.48	13.08	57.78	11.73
	Maternal-child health	16	54.97	10.30	62.50	17.98	54.46	17.47	50.00	24.34	42.86	16.50	58.33	11.29
	Total	99	55.35	9.88	63.59	16.16	55.16	17.96	48.37	25.96	45.86	14.11	57.32	12.49
	p-value		.636		0.074		0.399		0.000		0.310		0.918	
Age														
	25-29	12	60.04	11.07	65.48	21.50	64.29	20.66	55.56	25.95	51.19	14.23	60.56	12.21
	30-34	44	55.42	7.26	63.53	16.26	54.66	14.22	51.77	29.33	44.76	14.16	57.45	10.08
	35-39	21	55.56	9.33	66.67	11.37	55.10	21.33	46.03	19.65	48.30	13.15	55.87	12.01
	40-44	11	55.94	6.26	64.94	7.46	51.95	9.63	39.39	25.03	44.16	13.48	62.42	13.42
	45 & above	11	48.95	17.60	54.55	21.96	50.65	26.62	39.39	20.10	41.56	16.23	50.91	19.61
	Total	99	55.35	9.88	63.59	16.16	55.16	17.96	48.37	25.96	45.86	14.11	57.32	12.49
	p-value		.115		0.353		0.387		0.343		0.441		0.213	
Work experience (years)														
	5 years or less	16	56.73	9.54	62.50	22.05	55.36	14.64	50.00	27.22	50.89	11.63	58.75	12.22
	6-10 years	55	56.13	8.40	63.79	14.95	57.14	17.07	53.45	27.17	45.15	13.83	57.47	11.70
	11 & above	28	53.02	12.43	63.78	15.30	51.02	21.09	36.90	18.90	44.39	15.72	56.19	14.45
	Total	99	55.35	9.88	63.59	16.16	55.16	17.96	48.37	25.96	45.86	14.11	57.32	12.49
	p-value		.334		.959		.339		.019		.292		.803	
Highest level of education														
	Secondary level	25	52.00	12.66	54.86	21.30	53.14	22.02	40.00	27.22	43.43	13.97	56.53	15.29
	Advanced level	67	56.30	8.43	66.87	13.08	55.88	16.32	49.76	24.67	46.43	13.83	57.29	11.57
	Bachelor level	7	58.24	10.23	62.50	13.09	55.36	19.37	62.50	27.82	48.98	18.18	60.00	11.82
	Total	99	55.35	9.88	63.59	16.16	55.16	17.96	48.37	25.96	45.86	14.11	57.32	12.49
	p-value		.129		.005		.811		.074		.555		.795	
In-service training														
	Yes	3	63.25	6.45	57.14	14.29	80.95	21.82	66.67	33.33	52.38	21.82	62.22	3.85
	No	96	55.10	9.89	63.78	16.24	54.37	17.36	47.81	25.71	45.66	13.93	57.17	12.64
	Total	99	55.35	9.88										
	p-value		.161		.486		.011		.217		.419		.493	

The analysis of knowledge mean scores per working departments was also completed using one-way ANOVA test. This analysis did not show significant differences in mean score of nurses working in medical surgical (n=69, mean=54.96, SD=10.16), pediatric (n=14, mean=57.69, SD=8.09) and maternal-child services (n=16, mean=54.96, SD=10.29), $F(2,96)=0.454$, $p=0.636$.

The nurses' knowledge score was also analyzed per their age groups using one-way ANOVA test. It was found that though younger nurses score higher (n=12, mean=60.04, SD=11.06) than their counterparts in 30-34 (n=44, mean=55.41, SD=7.25), 35-39 (n=21, mean=55.55, SD=9.32), 40-44 (n=11, mean=55.94, SD=6.26) and 45 years and above (n=11, mean=48.95, SD=17.59), but these differences were not statistically significant $t(4,94)=1.913$, $p=0.115$.

We also analyzed the nurses' knowledge scores in relation to their work experience using one-way ANOVA test. Overall, this test did not show significant differences in the mean scores of those working for 5 years or less (n=16, mean=56.73, SD=9.54), for 6-10 years (n=55, mean=56.13, SD=8.39) and those with 11 years and above (n=28, mean=53.02, SD=12.42), $t(2,96)=1.108$, $p=0.334$.

With regard to nurses' level of education attainment and their knowledge of PU prevention and management, one-way ANOVA test revealed that the score increased with the level of nurses' education. However, the differences observed were not statistically significant: secondary (n=25, mean=52.00, SD=12.65), advanced (n=67, mean=56.29, SD=8.43), Bachelor (n=7, mean=58.24, SD=10.22), $t(2,96)=2.091$, $p=129$.

Finally, the nurses' knowledge was assessed in relation to having received in-service training or not. This was done using independent samples t-test. The test yielded significantly a higher mean score for nurses who had in-training services (n=3, mean=63.24, SD=6.45) than that of nurses who did not have in-service training (n=96, mean=55.10, SD=9.88). These differences were however not statistically significant $t(97)=1.414$, $p=0.161$.

4.3.1. Nurses' attitudes towards PU prevention

The second objective of this study was to assess the nurses' attitudes regarding pressure ulcer prevention. This was done using 11 items. Participants had to state whether they strongly agree (5), agree (4), neither agree or disagree (3), disagree (2), and strongly disagree (1). This order was reversed during analysis for items number 1, 6, 7, and 11. A total score was calculated by adding up all of 11 items. Given this, the minimum possible score was 11 while the maximum possible score was 55. The higher the score the most positive attitude. Table 4.6 summarizes the total score on participants' attitudes towards pressure ulcer. Overall, participants exhibited a positive attitude towards PU prevention (median=42.0, range 23 - 51). Participants were classified as having negative attitude if they scored less than 40 out of 55, and as having a positive attitude for a score of 40 and greater (Moore and Price, 2004). According to Table 4.6, only 13 participants (12.7%) had negative attitudes whereas 89 participants (87.3%) had positive attitude.

Table 4. 6: Participants' attitudes towards PU prevention (N=102)

Attitude	Frequency	Percent
Negative attitude	13	12.7
Positive attitude	89	87.3
Total	102	100.0

Table 4. 7. Nurses attitudes towards PU prevention and management per item (N=102)

Item	Mean	SD	N
All patients are at potential risk of developing pressure ulcers	2.57	1.095	102
Pressure ulcer prevention is time consuming for me to carry out	3.76	.977	102
In my opinion, patients tend not to get as many PUs nowadays	3.04	.933	102
I do not need to concern myself with PU prevention in my practices	4.55	.726	102
Pressure ulcer treatment is a greater priority than pressure ulcer prevention	4.14	.690	102
Continuous assessment of patients will give an accurate account of their pressure ulcer risk	4.76	.692	102
Most pressure ulcers can be avoided	3.81	.898	102
I am less interested in PU prevention than other aspects of care	4.44	.991	102
My clinical judgement is better than any PU risk assessment tool available to me	2.50	1.192	102
In comparison to other areas of care , PU prevention is a low priority for me	3.91	.945	102
Pressure ulcer risk assessment should be regularly carried out on all patients during their stay in hospital	4.59	.788	102
Subscale mean	3.83		

Table 4.7 provides nurses' scores on their attitudes towards PU prevention and management. It is obvious that nurses scored lower on use of clinical judgment rather than the clinical tool (mean=2.50, SD=1.19), and on the risk of developing PU for all patients (mean=2.57, SD=1.09). Nurses were indifferent on the opinion regarding the incidence of PU (mean=3.04, SD=0.93). Nurses scores were however higher on items related to carrying out regularly PU risk assessment to all patients (mean=4.59, SD=0.78) and being concerned about PU prevention in their practice (mean=4.55, SD=0.72).

4.3.2. Nurses attitudes towards PU prevention and management per socio-demographic characteristics

Females (n=85, mean=42.24, SD=3.79) and males' (n=17, mean=41.29, SD=4.59) scores on attitude toward PU prevention and management were not statistically different as revealed by results from independent samples t-test, $t(100)=0.900$, $p=0.370$.

To compare single, married and widow nurses' scores on their attitude, one-way ANOVA test was done. Overall, it was found that score for single (n=20, mean=43.05, SD=4.04), married (n=80, mean=41.85, SD=3.94) and widow nurses (n=2, mean=41.50, SD=0.70) were not statistically different, $F(2,99)=0.764$, $p=0.469$.

Nurses' attitudes were also analyzed in relation to their working services. One-way ANOVA test was used. Nurses from medical-surgical (n=71, mean=41.82, SD=3.77) had a slightly lower score on attitudes compared to their counterparts from Pediatric ward (n=15, mean=42.13, SD=3.35) and maternal and child health services (n=16, mean=43.19, SD=5.04); these differences were not however statistically significant, $F(2,99)$, $p=0.456$.

With regard to the nurses' age groups, one-way ANOVA test showed that older nurses (45 years and above) had a lower score (n=11, mean=39.27, SD=7.03) compared to other groups, 25-29 years (n=12, mean=42.00, SD=4.78), 30-34 years (n=47, mean=42.62, SD=3.13), 35-39 years (n=21, mean=42.10, SD=3.20), 40-44 years (n=11, mean=42.64, SD=2.29). However, the differences between these mean scores of attitudes were not statistically significant, $F(4,97)=1.726$, $p=0.151$.

The nurses' attitudes towards PU prevention and management were also assessed in relation to their work experience. One-way ANOVA test was used. This test showed that the nurses' mean scores on attitudes were not statistically different considering their experiences of 5 years or less (n=16, mean=42.00, SD=4.38), 6-10 years (n=58, mean=42.67, SD=2.76), and 11 years and above (n=28, mean=40.89, SD=5.37), $F(2,99)=1.975$, $p=0.144$.

In relation to nurses' educational attainment, one-way ANOVA test showed that there were no statistically differences in the mean score of secondary level nurses (n=25, mean=41.84, SD=4.81), advanced level nurses' mean score (n=69, mean=42.30, SD=3.77) and Bachelor level nurses' mean score (n=8, mean=40.88, SD=1.72), $F(2,99)=0.530$, $p=0.590$.

4.4 .1. Nurses' practices about PU prevention and management

This study assessed also the nurses' practices about PU prevention. This was done using 29 dichotomous items (Yes/No). On the items related to assessing patients at risk of developing PU using the stated scales (Braden, Norton and Waterlow), a new combined variable coded yes (1) for the use of any of the three scales and no (0) for no use of any of these scales was generated. The mean score and standard deviation for each of the 29 items is displayed in Table 4.8.

Table 4. 8. Nurses' scores on their practices about PU per item (N=102)

Variable	N	Mean	Std. Deviation
Assessing the skin conditions on prominent areas : assessing intactness	102	.88	.324
Assessing the skin conditions on prominent areas : assessing color	102	.80	.399
Assessing the skin conditions on prominent areas : assessing sensation	102	.27	.470
Assessing the skin conditions on prominent areas : assessing temperature	102	.88	.324
Assessing the skin conditions on prominent areas: assessing skin moisture	102	.81	.391
Assessing patient at risk of developing PU using: Braden scale	102	.61	.491
Assessing patient at risk of developing PU using: Norton scale	102	.15	.383
Assessing patient at risk of developing PU using: Waterlow scale	102	.07	.290
Scale use	102	.6667	.47373
Documenting all data related to the skin condition including PU development	102	.56	.499
Relieving pressure by using support surface: bed (foam, air, water mattress)	102	.86	.346
Relieving pressure by using support surface: chair	102	.61	.491
Relieving pressure by using pressure relieving devices: Trapeze, pillow	102	.92	.270
Relieving pressure by using patient repositioning	102	.96	.195
Assisting patient with impaired mobility with: turning and changing position every 2 hours	101	.88	.355
Assisting patient with impaired mobility with:rising the head from the bed below 30degree	102	.46	.520
Assisting patient with impaired mobility by encouraging ambulation within patient's limits	102	.83	.375
Managing faecal incontinence by toileting plan	102	.35	.480
Managing faecal incontinence by soiling checks	102	.84	.365
Managing faecal incontinence by assisting with hygiene at the time of soiling	102	.84	.365
Managing faecal incontinence by treating the causes	102	.92	.270
Managing urinary incontinence by toileting plan	102	.34	.477
Managing urinary incontinence by wet checks	102	.85	.356
Managing urinary incontinence by treating the cause	102	.97	.170
Managing urinary incontinence by assisting with hygiene at the time of soiling	101	.88	.325
Managing urinary incontinence by using the skin barriers and protectants	102	.64	.483
Improving nutritional needs by providing supplement(proteins, Vit A and C)	102	.67	.474
Improving nutritional needs by feeding assistance	101	.43	.497
Improving nutritional needs by providing adequate fluid in take	102	.44	.499
Improving nutritional needs by providing dietetician consultation as needed	101	.69	.464
Patient's and health education on PU preventive measures during hospitalization	102	.99	.099
Patient's and health education on PU preventive measures before discharge	101	.66	.475

A total score was calculated by adding up 29 items coded as yes (1) or no (0). The minimum possible score was 0 whereas the maximum possible score was 29. After adding up scores, a mean of 21.0 (± 3.5) out of 29 was calculated. The final score was calculated per cent to allow classification of participants practices in 5 categories displayed in Table 4.9.

Table 4. 9 Categorization of Nurses with regards to their practices of PU prevention (n=97)

Level	Frequency	Percent
Very low level (<60%)	12	12.4
Low level (60.0 - 69.9%)	18	18.6
Moderate level (70.0 - 79.9%)	50	51.5
High level (80.0 - 89.9%)	14	14.4
Very high level (90.0-100%)	3	3.1
Total	97	100.0

According to data in Table 4.9, the majority of nurses had between moderate and very high level of practice: 3 nurses (3.1%) had a very high level of practice while 14 (14.4%) nurses were in the category of high level; and one out of two nurses (51.5%) had a moderate level of practice. However, a non-negligible percent of nurses had low (18.6%) and very low (12.4%) levels of practice.

4.2. Percent score on the nurses' practices and nurses' characteristics

In relation to the characteristics of the participants, an independent sample t-test showed that there was no significant difference in the percent mean score of females (n=82, mean=71.7, SD=11.51) and that of males (n= 15, mean=76.09, SD=14.65), $t(95)=-1.288$, $p=0.201$.

With regard to the nurses' marital status, one-way ANOVA test revealed no significant differences in single (n=20, mean=72.75, SD=12.19), married (n=75, mean=, SD=) and widow (n=2, mean=74.13, SD=17.06) nurses' percent scores, $F(2,94)=0.033$, $p=0.968$. Post Hoc test allowed to perform multiple comparisons of these percent mean scores, and no significant differences were found ($p=1$).

The nurses mean percent score was also assessed in relation to the type of service offered. The comparisons of mean was done using one-way ANOVA test. Overall, no significant difference was found between the mean percent scores of nurses working in the departments of medical-surgical (n=66, mean=72.46, SD=10.64), pediatric ward (n=15, Mean=68.96, SD=19.80), and maternal and child health (n=16, mean=75.43, SD=7.32), $F(2, 94)=1.116$, $p=0.332$.

The comparison of mean percent scores of nurses' practices of PU prevention using one-way ANOVA test yielded no significant differences between the mean scores for each age group, i.e. 25-29 years (n=12, mean=71.55, SD=17.40), 30-34 years (n=45, mean=71.87, SD=11.96), 35-39 years (n=18, mean=72.03, SD=9.30), 40-44 years (n=11, mean=74.60, SD=11.87), and 45 years and older (n=11, mean=73.98, SD=11.67), $F(4, 92)=0.173$, $p=0.952$.

Considering the nurses' work experience, the mean percent score increases with higher experience but the difference between the means is not statistically significant, $F(2,94)=0.641$, $p=0.529$. Nurses with 5 years or less scored lower ($n=15$, mean=69.42, SD=11.42) than those with 6-10 years ($n=55$, Mean=72.53, SD=13.35), who in return scored less than those with 11 and above years of work experience ($n=27$, mean=73.81, SD=9.48).

With regard to the nurses' educational attainment, one-way ANOVA test revealed that participants with a secondary level (lower level) scored significantly lesser ($n=25$, mean=69.93, SD=13.44) than those with advanced level ($n=65$, mean=72.14, SD=10.7), who in return scored lesser than nurses with Bachelor level of education ($n=7$, mean=83.74, SD=14.31), $F(2,94)=3.844$, $p=0.025$. Higher education level nurses' score was significantly different from the advanced level nurses' score ($p=0.044$) and from the secondary level nurses score ($p=0.021$). The Post Hoc test (Bonferroni) was used to compare means between them. The advanced level nurses' score was not statistically different from the secondary level nurses' score ($p=1.0$), but was statistically different from the Bachelor level nurses' one ($p=0.044$), see Table 4.10.

Table 4.10: Multiple comparisons (Bonferroni) of mean percent nurses' scores per education level (p value reported) (N=102)

Level	Secondary level	Advanced level
Advanced level	1.000	
Bachelor level	0.021	0.044

Independent samples t-test was used to compare the nurses' scores given their reception of in-service training or not. It was found out that nurses who received in-service training (n=3, mean=78.16, SD=26.78) had a higher score compared to that of those who did not receive in-service training (n=94, mean=72.23, SD=11.56). However, this difference was not statistically significant, $t(95)=0.837$, $p=0.405$.

4.5. Relationship between the knowledge, attitude, and practices

Table 4. 11: Correlation matrix between the knowledge, attitude, and practices (N=102)

Variable	Knowledge	Attitude	Practice
Knowledge	1		
Attitude	0.1767	1	
Practice	-0.1069	-0.1825	1

The nurses' scores on their knowledge, attitudes and practices were correlated. Table 4.11 showed that there was a positive lower correlation between the nurses knowledge and their attitudes ($r=0.178$, $p=0.078$), as well as a negative between the knowledge and the practices towards PU prevention and management ($r=-0.107$, $p=0.303$). Nurses attitudes were also negatively correlated with their practices ($r=-0.183$, $p=0.074$).

CHAPTER FIVE: DISCUSSION

Nursing care has an impact on pressure ulcer development and prevention. The general aim of this study was to assess the nurses' knowledge, Attitudes and practices regarding PU prevention among nurses working at Kibagabaga district hospital. More specifically the current research was aimed to identify the relationship between Nurses' knowledge, attitudes and practices. Furthermore different socio-demographic characteristics were described. Therefore this chapter discusses the finding from the current research basing on the objective of the study in the light of different studies done before.

Demographic, participants' characteristics and KAP in regards to PU prevention

The findings indicated that the majority of participants were female. This may be due to the fact that, the nursing profession in its origin was considered to be a profession of women whereby female were the most candidates in nursing education (Mukamana, Uwiyeze and Sliney, 2015) .Again male nurses' score was found to be significantly higher than that of female nurses . This may be related to other non-explored factors.

Single nurses scored higher than married nurses and widow nurses, respectively . Widow Nurses scored significantly lower than single and married nurses. This may be due to difficult living conditions including financial issues which may hinder an easy access to high education, the main source of knowledge and practices.

The participants were generally young adults; most of them were falling in age group of 30-34 years. This is an age group of young adults who are still strong and productive. Considering the African context and particularly in Rwandan context, most of the time higher studies are completed around 26 and 32 years.

In addition, majority of the participants were working in the medical surgical services, while the remaining participants originated from the pediatric ward and the maternal-child health services.

This is because medical surgical department enclose many services such as internal medicine for males and females, surgical words for male and females, accident and emergency service, palliative care service, outpatient department. Therefore many nurses are allocated in these services.

The most attained educational level were advanced diploma (A1) with a non negligible number of participants with only secondary level. These are low educational levels and the reason behind may be the cost of education in Rwanda and other non explored socio-demographic concerns as many of the participants are young adult, married and in the reproductive age. In addition to this the majority had not received in-service training related to PU prevention and management. This may be due to lack of guideline and protocol about PU prevention within the institution.

Nurses' knowledge in regards to PU prevention

Nurses' knowledge towards PU prevention, classification and management were found to be at a very low level in general. Per categorization of Knowledge related to PU prevention, mechanical load management was the least known aspect of knowledge by the nurses, followed by PU staging and description, risk assessment, preventive measures and risk factors respectively. In a detailed way participant do not have knowledge about use of Donut devices/ring cushions ,use of heel protectors, the appropriate time for turning confined to bed patients, the appropriate degree of bed elevation in side lying position. They also have difficult to describe and classify PU in categories whereby few nurses were able to recognize and classify stage III of PU. Only PU stage four is the most well described category of PU among others. Even if they have some information on PU risk factors they do not recognize hot water and soap as a risk factor which can lead to skin dryness and increase the risk of PU development. Other risk factor like low humidity and moisture are also known by few nurses as a predisposing factor to PU development.

This identified very low level of overall knowledge among nursing staff, about PU prevention is linked to low educational background (advanced diploma and secondary level) and the lack of continuous professional development in terms of training support on prevention of pressure ulcers.

In addition to these findings, other non negligible and non explored factors may be linked to the current identified nurses 'low level of knowledge. These include (1) limited access to education due to the limited financial means, lack of availability in terms of time. Most of the respondents were females, in reproductive age and married. Not only they work as nurses but also they are the family keepers. (2) Heavy workload is another challenge whereby only two nurses can be allocated in a ward having twenty two patients. This hinders not only the application of an even little known knowledge about pressure ulcer prevention and management but also limit the nurses' time to consult the up-to-date literature about PU prevention.

In regards to low level of Nurses' knowledge towards PU prevention, other many research done Uganda, Nigeria and Bangladesh support the current findings. The study done on Knowledge and practice of nurses towards prevention of pressure ulcer and associated factors in Gondar University Hospital, Northwest Ethiopia also support the current findings whereby they found that having higher educational status[Odds Ratio (AOR)= 2.4, 95 % CI (1.39-4.15)], attending formal training [AOR= 4.1, 95 % CI (1.29-9.92)] were positively associated with knowledge; while shortage of facilities and equipments, dissatisfaction with nursing leadership and inadequate staff number showed negative association with practice of nurse's pressure ulcer prevention (Nuru *et al.*, 2015).

Another over all very low level of nurses' knowledge(N=91) was identified by the studies done in Bangladesh by Shariful Islam, in 2009 whereby similar findings confirming an overall very low level of nurses' knowledge about PU prevention have been identified (N=91, Mean=57.79%, SD=9.20).

Nurses' attitudes in regards to PU prevention

The nursing staff had a positive attitude in regard to PU prevention with a non negligible number of participants who have negative attitude. Nurses positively believed that “PU risk assessment should be regularly carried out on all patients during their stay in hospital” and they were convinced that they are concerned by PU prevention in their practices and most PU can be avoidable. However the nurses had negative attitude on the use of clinical judgment rather than the clinical tool and they do not believe that all patients are at potential risk of developing pressure ulcers. Perception of using clinical judgment rather than clinical tool may be linked to lack of information in terms of formal education or training about the importance and the use of available clinical tool for predicting the risk of developing PU.

The studies done in Bangladesh, Ethiopia and Jordan were in line with the current finding. All these mentioned research showed that nurses had positive attitude in regard to PU prevention (Islam, Sae-Sia and Khupantavee, 2010; Qaddumi and Khawaldeh, 2014; Dilie and Mengistu, 2015). For example the research conducted in Jordan, 2013 ,strongly support the current findings whereby it revealed that the nurses had an overall positive attitude towards pressure ulcers prevention by perceiving that continuous nursing assessment of patients would give an accurate account of their PU risk (82%; n=197). Nurses also thought that most PUs could be avoided (82%; n=198) and they believed that they should be concerned with PU prevention during their practice (79%; n=190).

While the above study (done in Jordan) revealed that the nurses' positive attitude was influenced by their experience (The more a nurse had many years of working the more his/her attitude was positive), the current study is not congruent with it. The current findings showed that the nurses' mean scores on attitudes were not statistically different

considering their experiences of 5 years or less, 6-10 years and 11 years and above. Again this may be linked with their overall low level of Knowledge.

Most of the nurses have low level of education and they had not opportunity to have additional in service training as a way of continuous professional development. In this situation the experience cannot enhance the attitude (Qaddumi, Jamal Khawaldeh, Abdullah, 2014).

Again in regards to nurses' attitude on PU prevention and other socio-demographic characteristic, the current study revealed that age and working service impact the attitudes. For ages, old nurses (45 years and above) scored lower than young nurses(25-29 years, 30-34 years ,35-39 years and 40-44 years) on attitudes however this was not statistically significant .This may be explained by lack of updated information about PU prevention, via upgrading educational level and having regular CPD, nurses in these services can easily have poor attitudes in regards to PU prevention.

For working service, it was found that nurses from medical-surgical had a slightly lower score on attitudes compared to their counterparts from Pediatric ward and maternal and child health services; however these differences were not statistically significant. This may be to the fact that medical-surgical services were including many services including services like Operating room, OPD, minor surgery whereby they do not regularly or frequently take care of patients with PU for long time.(No hospitalization in these services). With inconsistent exposure to such patients and lack of updated information about PU prevention, via upgrading educational level and having regular CPD, nurses in these services can easily have poor attitudes in regards to PU prevention. for Other socio-demographic characteristic like sex, marital status, educational level , the current finding did not show an impact on nurses' attitudes in regards to prevention of PU.

Nurses' Practices in regards to prevention of PU: Generally the current findings reveled that nurses had between moderate and very high level of practice with a non-negligible percent of nurses had low and very low levels of practice.Patient's health

education on PU preventive measures during hospitalization, Managing urinary incontinence by treating the cause, managing fecal incontinence by treating the cause, Relieving pressure by using patient repositioning, changing position for every 2 hours, assessing skin intactness on prominent areas, Relieving pressure by using pressure pillow were the most reported practices to be done by nurses in regard to PU prevention.

The least performed practices in regards to prevention of PU were: using scales of predicting the risk of developing PU such as (Water low and Norton Braden), assisting patient with impaired mobility with rising the head from the bed below 30degree and Managing faecal incontinence by toileting plan.

Almost similar finding about patient's position change have been found in a comparative study done in teaching hospital of Korea whereby Position change was the most performed nursing practice to prevent PU development followed by skin care (Cho, Park and Chung, 2011). The same study revealed that more nursing interventions were documented by young nurses less experienced but more educated.

An association between (1) working experience and practices in regard to PU prevention and between (2) level of education and practices were also confirmed by the current findings whereby the more a nurse was experienced the more he/she had a high level of practices (but this correlation was not statistically significant). Again the more the nurse had a high level of education the more his/her practices toward prevention of PU was at a high and very high level (But the advanced level nurses' score was not statistically different from the secondary level nurses' score , but was statistically different from the Bachelor level nurses). While the study done in Korean teaching hospital showed correlation between age and level of practice, the current study did not revealed the same findings.

Correlation between KAP in regards to prevention of PU

Generally, the current research findings revealed that there was a negative correlation between the nurses' knowledge and their practices towards PU prevention and management. While knowledge was at very low, the practice level were at high and very high level. These findings are totally controversial to the fact that, between the periods of 2013-2017 the researcher's anecdotal observations (during clinical supervision revealed that the majority of hospitalized patients (around 15 out of 24 patients) especially in medical surgical services ,were having pressure ulcers. It means if the current finding reflected the real practice the number of PU case would be decreased. This may be due to the use of self-report questionnaire while assessing nurses' practice which might not reflect the actual nursing practices as participants may want to give the socially accepted answers. While poor nurses' attitudes, contribute to the development of pressure ulcers (Waugh, 2014) , in the current study there was a negative correlation between attitudes and practices. Only a positive lower correlation between the nurses' knowledge and their attitudes were found. The current finding are not supported Bloom taxonomy of educational learning objective developed by Bloom (1956) in which practice is influenced by knowledge and attitude.

Again, the current findings are not congruent with other different research findings which showed that Knowledge influence the attitude of nurses towards pressure ulcers, which in turn extensively correlated with the application of adequate pressure ulcer prevention (Manderlier *et al.*, 2017). This can be showed by a study done in Belgian Hospital which showed that nurses had inadequate knowledge (Mean score = 49.7%) about prevention of pressure ulcers but it showed a significant correlation between their attitude (Mean= 71.3%,) and application of preventive practice ($OR = 3.07, p = .05$) (Demarré *et al.*, 2012)

CHAPTER SIX: CONCLUSION AND RECOMMENDATION

6.1 CONCLUSION

Knowledge of the nurses regarding prevention of PU was very low but majority had a positive attitude toward PU prevention. Nurses had between moderate and high level of practices with a non-negligible proportion of nurses who had a low and a very low level of practice towards PU prevention. A lower positive correlation between the nurses' knowledge and their attitudes has been identified, as well as negative correlation between their knowledge and the practices towards PU prevention. Nurses' attitudes were also negatively correlated with their practices.

6.2. RECOMMENDATION

To the researchers, further interventional study to enhance Nurses' knowledge to generally improve the practice in regard to PU prevention and management are needed as a non negligible number has low level of practice. . For the next research it would be better if practices are assessed through observation to reduce possible bias from self report while using a self administered questionnaire.

To the University of Rwanda, specifically the schools of nursing to revise and update the curriculum in regards to PU prevention to enhance students nurses' knowledge before they reach the clinical setting.

To the hospital, it is highly recommended to conduct continuous professional development (CPD) and monitor its effectiveness on a regular basis. Protocols, guidelines and assessment tools are also needed and should be availed in services and be taught to nurses for their best utilization and ultimately for the best nursing care in regards to prevention of PU which will lead to the best patients 'outcome. Inter-professional collaboration is another option to enhance patient's care in regards to PU prevention.

The researcher also recommended that the PU cases should be well documented and reported to the Ministry of Health as it is done for non-communicable and communicable diseases to easily know the incidence and prevalence at central level so that policy makers are able to take measures accordingly.

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APPENDIX

APPENDIX I. ENGLISH VERSION QUESTIONNAIRE

NURSES' KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING PREVENTION OF PRESSURE ULCERS

Instructions

The name should not appear on the question paper, only codes are used.

This questionnaire comprises four sections and it has been only designed for research purpose. Below you are given some questions, please provide your most appropriate answer by ticking (put a V) in the appropriate box and filling in the provided space.

SECTION I: DEMOGRAPHIC DATA

1. Sex: Female Male
2. Marital status: Single Married Divorced Widow
3. Age:.....Years old
4. Working service:.
Surgical ward
Internal medicine
Pediatric ward
Accident and Emergency
Out Patient Department(OPD)

Palliative care service

Maternity service:

Labor ward

Post partum ward

Neonatal ward

5. Working experience:.....

6. Highest Educational level obtained

1.A2

2. A1

3.A0

4. Other: please specify.....

7. Have you ever had any in-service training about Pressure ulcer prevention and management? Yes No

If yes, how long was the course?.....

SECTION II: NURSES'KNOWLEDGE TOWARDS PU PREVENTION, CLASSIFICATION AND MANAGEMENT

Multiple Choice questions: True/False / don't know: For each statement, please tick where appropriate for your best answer.

	True	False	Don't Know
1. Stage I pressure ulcers are defined as intact skin with non-blanchable erythema in lightly pigmented persons.			
2. Risk factors for development of pressure ulcers are immobility, incontinence, impaired nutrition, and altered level of consciousness.			
3. All hospitalized individuals at risk for pressure ulcers should have a systematic skin inspection at least daily and those in long-term care at least once a week.			
4. Hot water and soap may dry the skin and increase the risk for pressure ulcers.			
5. It is important to massage bony prominences.			
6. A Stage III pressure ulcer is a partial thickness skin loss involving the epidermis and/or dermis.			
7. All individuals should be assessed on admission to a hospital for risk of pressure ulcer development.			
8. A Stage IV pressure ulcer is a full thickness skin loss with extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structure.			
9. An adequate dietary intake of protein and calories should be maintained during illness.			
10. Persons confined to bed should be repositioned every 3 hours.			
11. A turning schedule should be written and placed at the bedside.			
12. Heel protectors relieve pressure on the heels.			
13. Donut devices/ring cushions help to prevent pressure ulcers.			

	True	False	Don't Know
14. In a side lying position, a person should be at a 30-degree angle with the bed unless inconsistent with the patient's condition and other care needs that take priority.			
15. The head of the bed should be maintained at the lowest degree of elevation (hopefully, no higher than a 30 degree angle) consistent with medical conditions.			
16. A person who cannot move him or her should be repositioned every 2 hours while sitting in a chair.			
17. Persons who can be taught should shift their weight every 30 minutes while sitting in a chair.			
18. Chair-bound persons should be fitted for a chair cushion.			
19. Stage II pressure ulcers are a full thickness skin loss.			
20. The epidermis should remain clean and dry.			
21. The incidence and prevalence of pressure ulcers are so high that it would be better if the institution appoint a team to study risk factors, prevention, and treatment.			
22. A low-humidity environment may predispose a person to pressure ulcers.			
23. To minimize the skin's exposure to moisture on incontinence, underpads should be used to absorb moisture.			
24. Slough is yellow or creamy necrotic tissue on a wound bed.			
25. Bony prominences should not have direct contact with one another.			
26. Every person assessed to be at risk for developing pressure ulcers should be placed on a pressure-redistribution bed surface.			
27. Blanching refers to whiteness when pressure is applied to a reddened area.			
28. A pressure redistribution surface reduces tissue interface pressure below capillary closing pressure.			
29. Skin macerated from moisture tears more easily.			

	True	False	Don't Know
30. A pressure ulcer scar will break down faster than unwounded skin.			
31. A good way to decrease pressure on the heels is to elevate them off the bed.			
32. All care given to prevent or treat pressure ulcers must be documented.			
33. Devices that suspend the heels protect the heels from pressure.			
34. Shear is the force that occurs when the skin sticks to a surface and the body slides.			
35. Friction may occur when moving a person up in bed.			
36. A low Braden score is associated with increased pressure ulcer risk.			
37. Stage II pressure ulcers may be extremely painful due to exposure of nerve endings.			
38. For persons who have incontinence, skin cleaning should occur at the time of soiling and at routine intervals.			
39. Educational programs may reduce the incidence of pressure ulcers.			

SECTION III: NURSES' ATTITUDES TOWARDS P.U PREVENTION

Please tick where appropriate (in the box) for your best answer to show your view about PU prevention

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. All patients are at potential risk of developing pressure ulcers					
2. Pressure ulcer prevention is time					

consuming for me to carry out					
3. In my opinion, patients tend not to get as many pressure ulcers nowadays					
4. I do not need to concern myself with pressure ulcer prevention in my practice					
5. Pressure ulcer treatment is a greater priority than pressure ulcer prevention					
6. Continuous assessment of patients will give an accurate account of their pressure ulcer risk					
7. Most pressure ulcers can be avoided					
8. I am less interested in pressure ulcer prevention than other aspects of care					
9. My clinical judgment is better than any pressure ulcer risk assessment tool available to me					
10. In comparison with other areas of care, pressure ulcer prevention is a low priority for me					
11. Pressure ulcer risk assessment					

should be regularly carried out on all patients during their stay in hospital					
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SECTION IV: NURSES' PRACTICE ABOUT PU PREVENTION AND MANAGEMENT

Does the care plan for pressure ulcers prevention address all the areas below (Please tick where appropriate for your best answer)?

	Yes	No
<p>Assessing the skin conditions particularly on prominent areas (trochanters, ischium, sacrum, heels, elbows, and the back of the head and under medical devices)</p> <p>a. Intactness b. Color c. Sensation d. Temperature e. Moisture</p>		
<p>Assessing patient at risk of developing pressure ulcers</p> <p>Using the following scale:</p> <p>a. Braden scale b. Norton scale c. Waterlow scale</p>		

<p>Documenting all data related to the skin condition including pressure ulcer development</p>		
<p>Relieving pressure by using:</p> <ul style="list-style-type: none"> a. Support surfaces: Bed (foam, air, and water bed mattresses) b. Support surfaces: Chair c. Pressure-relieving devices: Trapeze, Pillow (e.g.: put pillow under patients' leg from mid-calf to ankle to keep heels off the bed) d. Repositioning 		
<p>Assisting patient with impaired mobility with:</p> <ul style="list-style-type: none"> a. Turning & changing position every 2hours b. Raising the head from the bed below 30⁰C c. Encourage ambulation (within the patient's limit) 		
<p>Managing Fecal Incontinence:</p> <ul style="list-style-type: none"> a. Toileting plan b. Soiling checks c. Assisting with hygiene at the time of soiling d. Treating the causes 		
<p>Managing Urinary Incontinence by</p> <ul style="list-style-type: none"> a. Toileting plan b. Wet checks c. Treating the causes d. Assisting with hygiene at the time of soiling e. Using of the skin barriers and protectants 		

<p>Improving Nutritional needs by providing:</p> <ul style="list-style-type: none"> a. Supplements (protein, Vitamin A and C for malnourished patients) b. Feeding assistance c. Adequate fluid intake d. Dietitian consultation as needed 		
<p>Patient's & care giver's health education on pressure ulcer preventive measures</p> <ul style="list-style-type: none"> a. During hospitalization b. Before discharge 		

Thank you for your collaboration and contribution in this research.

APPENDIX II. INFORMED CONSENT FOR THE PARTICIPATION IN THE RESEARCH STUDY (English version)

Introduction

My name is **MWISENEZA Marie Josée**, a graduate student at the University of Rwanda/ College of Medicine and Health Sciences in Master of Science in Nursing/ Medical surgical track.

I am inviting you to participate in my research titled “**NURSES’ KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING PREVENTION OF PRESSURE ULCERS IN A SELECTED DISTRICT HOSPITAL IN RWANDA**”

Purpose of the study

The purpose of this study is to assess Knowledge, attitudes and practices on prevention of pressure ulcers among nurses working at Kibagabaga district hospital.

Description of study procedures

You will be asked to choose your best answer by ticking in the provided box and place. This will take approximately 20 minutes of your time. Please don’t write your name on the questionnaire.

Confidentiality

Confidentiality will be maintained as no names will appear on the questionnaire at any stage of data collection and they will be coded. Signed consent forms will not be attached to instruments to ensure anonymity. Data will be stored in a locked cabinet and not be accessible to any other person other than the investigator. However, absolute confidentiality cannot be guaranteed and personal information may be disclosed if required by the law. The supervisors of the researcher and the institutional review board (IRB) of the college of Medicine and health sciences will also access the data for the quality and data analysis. All documents for the study will be destroyed after 5

years of study completion.

Right to refuse or withdraw from the study

The participation in the current study is purely voluntary. You may participate or not and if you do not wish to continue, you have the right to withdraw from the study, without penalty and this, at any time.

Risks of the study

There will be no risks from participating in the current study. As explained, do not write your name on the questionnaire. Neither your colleague nor your employers will access on the information you provided and you will be treated the same as usual.(no consequences to participate).

I am ready to provide you more explanations about the provided question. Please feel free to ask any question you don't understand or other clarification on this study.

Benefits of the study

The benefit of this research is that you will help us to know the level of nurses 'knowledge, their attitudes and practices to find out where are the gap to create strategies to overcome them. At individual level as a participant, your participation in this study will help you to be aware on your own level of knowledge, attitudes and practices regarding pressure ulcers prevention to finally correct where necessary.

Right to Ask Questions and Report Concerns

You have the right to ask questions about this research study and getting answers from either the researcher (me), or the supervisor before, during and after the study.

If you have any further questions about the study, feel free to contact the researcher (me). At any time. Here are the contacts: The telephone number: **+250 788 600 766** & E-mil: **jmwiseneza@gmail.com**

If needed, you can also contact the followings:

A. Contact details of the supervisors

1. UWAMAHORO Marie Claire , RN (Main Supervisor)

Masters program-Medical-surgical track

University of Rwanda

College of Medicine and Health Sciences

School of Nursing and Midwifery

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Phone: +250 788 402 547

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2. Professor Busisiwe Benghu(Over all Supervisor)

Human Resources for Health (HRH)

Masters Program – Critical Care Track

Kwazulu natal University-South Africa

E-mail: bhengub2@ukzn.ac.za

For any concern about this project, please contact the Institutional Review Board (IRB)

B. Contact details of the ethical board

Institutional Review Board

Research Office

University of Rwanda

Kigali, Rwanda

Tel+250 788 563 312

Email: researchcenter@ur.ac.rw

CONSENT TO PARTICIPATE IN THE STUDY

Your signature below indicates that you have decided to be a volunteer as a research participant for this study, and that you have read and understood the information provided above.

Names of the participants:

Signature of participant

Date:.....

Print name of investigator:.....

Signature of the investigator:.....

.....Date.....

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 09/01/2017
Ref: CMHS/IRB/041/2017

MWISENEZA Marie Josée
School of Nursing and Midwifery, CMHS, UR

Dear MWISENEZA Marie Josée




RE: ETHICAL CLEARANCE

Reference is made to your application for ethical clearance for the study entitled "*Nurses' Knowledge, Attitudes And Practices Regarding Prevention Of Pressure Ulcers In A Selected District Hospital In Rwanda.*"

Having reviewed your protocol and found it satisfying the ethical requirements, your study is hereby granted ethical clearance. The ethical clearance is valid for one year starting from the date it is issued and shall be renewed on request. You will be required to submit the progress report and any major changes made in the proposal during the implementation stage. In addition, at the end, the IRB shall need to be given the final report of your study.

We wish you success in this important study.

Fes Professor Kato J. NJUNWA
Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR

Cc:

- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate studies, UR